AT-1

REF.NO. C12-1501

GENERAL

CONTENTS

	Address
Introduction	A-4
Specifications	A-5
1. Camera Type	A-5
2. Format	A-5
3. Interchangeable Lenses	A-5
4. Viewfinder	A-5
5. Exposure Metering	A-5
6. Shutter	A-5
7. Film Transport	A-6
8. Flash	A-6
9. Power Source	A-7
10. Physical Characteristics	A-7
11. Accessories	A-7
Light Metering Sequence	A-8
1. FD Lenses	A-8
2. FL Lenses	A-8
Exposure Adjustment Mechanism	A-9
1. FD Lenses	A-9
2. FL Lenses	A-9
Electronic Circuit	B-1
1. Low Voltage Lockout Circuit	B-1
2. First Release Magnet (Mg2) Circuit	B-2
3. Self Timer Circuit	B-3
4. Self Timer LED Oscillator	B-3

Illustrations

Figure 1. Exposure Adjustment Mechanism	A-10
Figure 2. Exposure Control	A-11
Figure 3. Electronic Control Circuits	A-11
Figure 4. Viewfinder Information	A-12
Figure 5. Optical Schematic	A-13
Figure 6. Central Emphasis Metering	A-14
Figure 7. Lockout Circuit Schematic	B-1
Figure 8. Mg2 Schematic	B-2
Figure 9. Self Timer Schematic	B-3
Figure10. Self Timer LED Schematic	B-3
Table 1. Exposure Meter Coupling Range	A-14

INTRODUCTION

The CANON AT-1 is the second camera using the revolutionary production techniques and design expertise developed for the Canon AE-1. The AT-1 is a match-needle full aperture metering TTL brother to the microcomputer equipped full automatic AE-1.

It is identical in size and weight and uses many of the same basic parts including the complete shutter unit. A high sensitivity CdS replaces the SPC and MOS amplifier and exposure computation is mechanical rather than electronic. Electronic shutter timing and control is nearly identical to the AE-1.

A repairman who has mastered the AE-1 should have no difficulty with the AT-1 after studying this service manual.

SPECIFICATIONS

1. Camera Type: 35mm Focal Plane Shutter Single Lens Reflex

2. Format: 24 X 36mm

3. Interchangeable Lenses: Canon FD Lenses for full aperture metering
Canon FL Lenses for stopped-down metering

4. Viewfinder: Fixed eye-level pentaprism without condenser lens

4.1. Field of View: 93.5% vertical , 96.3% horizontal

4.2. Magnification: 0.82X with 50mm lens at infinity

4.3. Viewfinder focus: -1 diopter

4.4. Rangefinder : Combined split-image/microprism focusing aid in center of fine ground glass full focusing screen
Split-image prism is 2.5mm diameter with an 8° prism angle. Microprism circle has a 5mm outer diameter and an 8°prism angle.

4.5. Viewfinder Information : Straight meter needle and circular match needle (aperture needle) are at the right of the screen. The combination battery check and overexposure warning mark is at top right and the underexposure at the lower right.

4.6. Mirror Cut-off: There is no mirror cut-off with lenses of any focal length up to and including the FD 400mm f/4.5 S.S.C..

5. Exposure Metering

5.1. Photocell : Thru-the-lens (TTL) metering with high sensitivity CdS located above the eyepiece at the rear of the pentaprism

5.2. Measurement Area: Central Emphasis Metering Sensitivity
(See figure 6 for metering pattern.)

5.3. Meter Coupling Range: With a f/1.4 lens and ASA 100 film:
EV3 (f/1.4, 1/4 sec.) to
EV17 (f/16, 1/500 sec.)

6. Shutter

6.1. Type: Fully electronically controlled double roller focal plane shutter, Rubberized cloth curtains

6.2. Shutter Speeds: Discrete shutter speeds from 1/1000 sec. to 2 full seconds plus a "B" setting for time exposures. X synchronization is at 1/60 sec. ("B" exposures are terminated 1/60 sec. after the shutter button is released.)

6.3. Shutter Speed Dial: The dial is concentric with the film advance lever at the right end of the top deck. A protective guard prevents accidental movement when advancing the film.

6.4. Self Timer: Electronic self timer with a ten second delay The timer is noiseless. A red LED flashes to indicate operation and is visable from the subject position.
The self timer may be cancelled in mid-cycle by turning the main switch off.

7. Film Transport

7.1. Loading : Back cover opens by pulling up on the film rewind crank. A multi-slot take-up spool allows sure and easy film loading.

7.2. Film Advance: By top mounted lever, operational stroke is 120°with a 30°stand-off. Ratchet winding is possible.

7.3. Rewinding: Self-locking rewind button on bottom of camera enables rewinding by crank on left end of top deck.

7.4. Frame Counter: Additive type, automatically resets when back cover is opened. It counts down when rewinding. Counter reads from "S" (start or -2) to 38. "0" and final frames for common film lengths (20 , 36) are in orange. Other even numbers are in white, and odd numbers are indicated by dots.

8. Flash

8.1. Automatic Flash: When used with the SPEEDLITE 155A the shutter speed is automatically set to 1/60 sec. when the ready light is lit. (Exception: If shutter is set at "B")

8.2. Flash connections: The accessory shoe has a direct contact as well as the special shutter speed switching contact. There is a normal P.C. (JIS-B) flash terminal on the front of the top deck at the left.

8.3. Synchronization: X sync only, Flash bulbs may be used at 1/15 sec. or slower speeds.

9. Power Source: 1 6V silver oxide battery: JIS 4J13 ,
EVEREADY and UCAR No. 544 , MALLORY PX28.

10. Physical Characteristics: 141 x 47.5 x 87 mm , 590 g
Body only

11. Accessories

11.1. FD Lenses (FL Lenses)

11.2. Power Winder A

11.3. Speedlite 155A

11.4. Data Back A

11.5. Camera Holder F3

11.6. Angle Finders A2 & B

11.7. Magnifier S

11.8. Eyecup 4S

11.9. Dioptric Adjustment Lenses S (10 strengths)

11.10. Body Cap

11.11. PC Cover

11.12. Accessories for close-up, photomacrography, photomicrography and oscilloscope photography

LIGHT METERING SEQUENCE

1. FD Lenses —— TTL Match needle open aperture metering

1.1. Set the film speed (ASA) by lifting and turning the shutter speed dial. (Set the winding lever in the ready (30°standoff) position).

1.2. Set the shutter speed.

1.3. Turn the main switch on.
(To check the battery , set the switch to "C". The needle should rise to the overexposure warning mark.)

1.4. Turn the aperture ring until the aperture needle and meter needle are aligned. Perfect exposure is indicated when the meter needle bisects the aperture needle. Aperture needle extremes indicat ± 1/2 EV exposure.

(Notice: Stopped-down metering should not be used with an FD lens mounted. Due to the open aperture metering correction mechanism, stopped-down or shooting aperture readings will be in error by the amount of the correction. (For a f/1.4 lens the metering error will be 0.9 f/stops overexposure.)

2. FL Lenses —— TTL Match needle stopped-down metering

2.1. Perform steps 1.1 thru 1.3. above. When the shutter speed is set the aperture needle will move to a certain position.

2.2. Press in the stop down lever, or set the lens "A-M" ring to "M". Either system may be used .

2.3. Turn the aperture ring until the meter needle bisects the aperture needle.

(Note: The "aperture needle" of the AT-1 is actually coupled to both the shutter speed dial and the aperture ring of FD lenses. The name was adopted from previous models in which the "aperture needle" was coupled to the aperture only.)

EXPOSURE ADJUSTMENT MECHANISM

Note: Call-out numbers refer to the larger numbers in figure one.

1. FD Lenses —— TTL Match needle open aperture metering

The preset ASA and shutter speed value (Sv-Tv) (1) is transmitted to the information convertor cam (2) by the linkage rope. Slide lever (3) moves in accordance with the position of the information convertor cam. For correct metering at maximum aperture both the maximum aperture correction information and the preset aperture information must be fed to (3). The maximum aperture correction is input when the lens is installed by the lens maximum aperture pin pushing maximum aperture signal pin (4) and lever. This action determines the rotational axis of the match needle operation lever (5).

The preset aperture information is input by the lens aperture signal lever pressing down on the camera's aperture signal lever (6) . The position of (6) is fed thru the aperture signal cam (7) to the aperture signal slide (8).

Information from (3) and (8) is combined on the calculation lever (9) moves the calculation result lever (10) which in turn moves the match needle lever (5) .

Match needle lever (5) couples with the match needle (aperture needle) and moves it to the correct position determined by the above mechanical computation. (The coupling of (5) and the aperture needle is shown separated from the main mechanism for clarity.)

Since the meter needle varies with the actual scene brightness, it is only necessary to vary either the preset aperture or shutter speed setting until the two needles match to insure correct exposure.

Notice: Do not use stopped-down metering with FD lenses.

2. FL Lenses —— TTL Match needle stopped-down metering

When metering with FL lenses which have no aperture signal lever or maximum aperture correction pin, the aperture needle is coupled only to the shutter speed and ASA (Sv-Tv) value. There are no inputs at either (4) or (6).

The stopped-down lever is pushed. This actually stops the lens down to the preset aperture and the meter needle moves in accordance with the actual amount of light passing thru the lens at the stopped-down aperture.

When the shutter speed is changed the aperture needle will move and when the preset aperture ring is changed the meter needle will move. Matching them insures correct exposure.

Note: This method works with manual lenses such as the TS 35mm f/2.8 S.S.C. also.
Canon recommends that the shutter speed be set first and then the aperture, especially in action photograph.

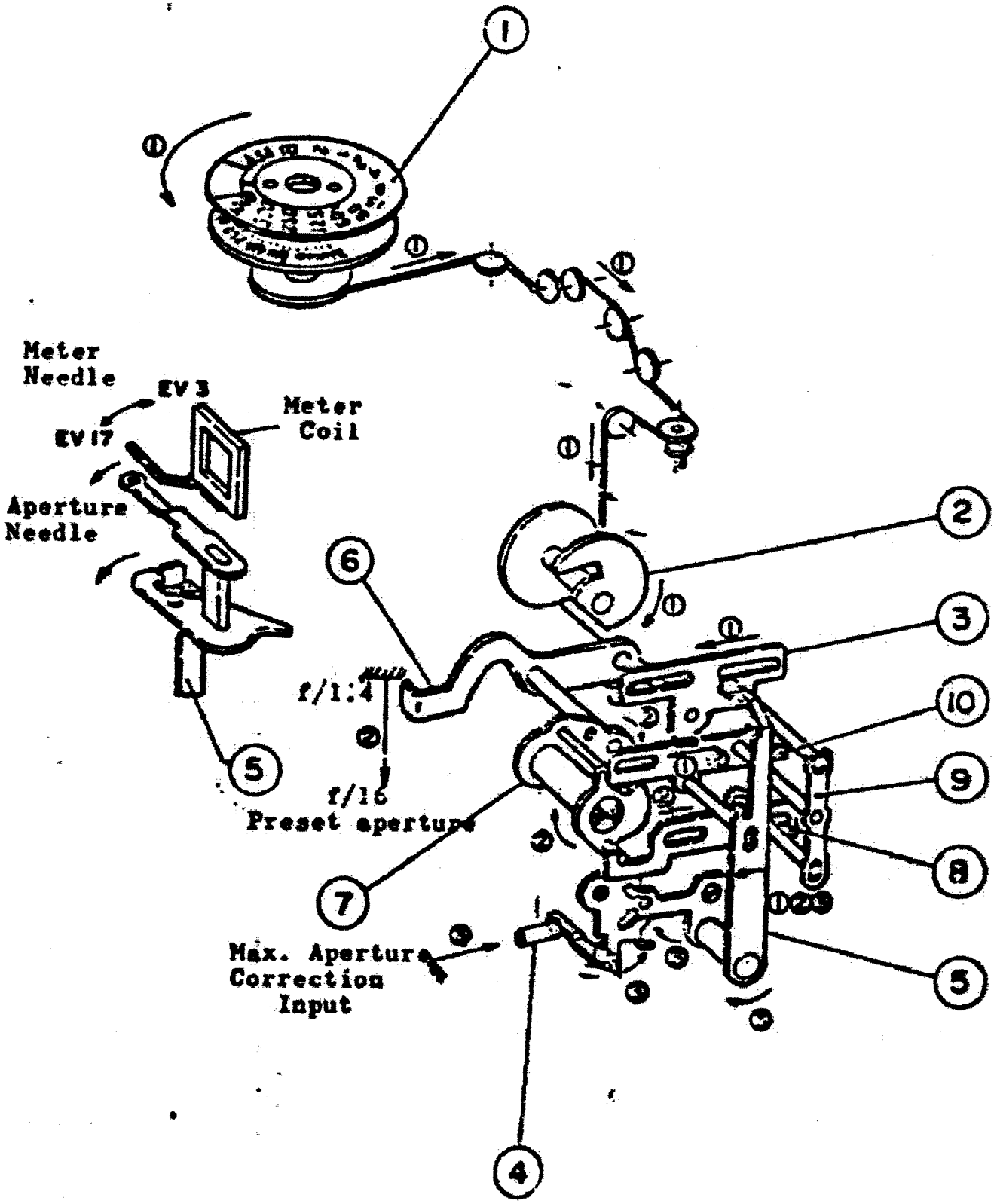

Meter
Needle
EV 3
EV 17
Meter
Coil
Aperture
Needle
f/1:4
f/16
Preset aperture
Max. Aperture
Correction
Input
1
2
3
4
5
6
7
8
9
10

Fig. 2:

Exposure Control (Functional Block Diagram)

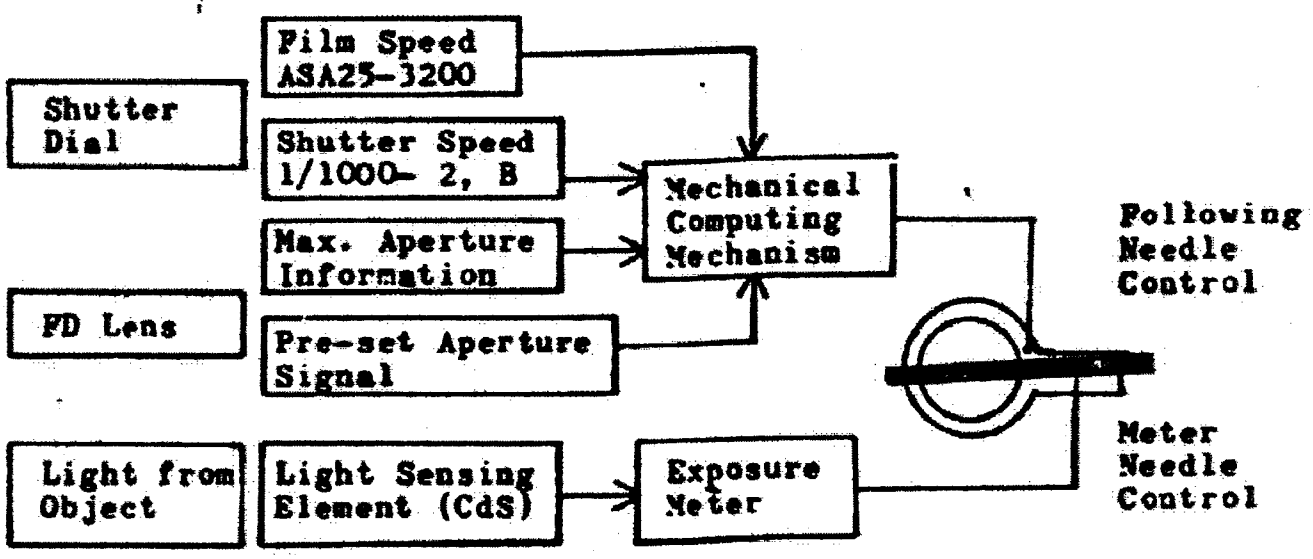
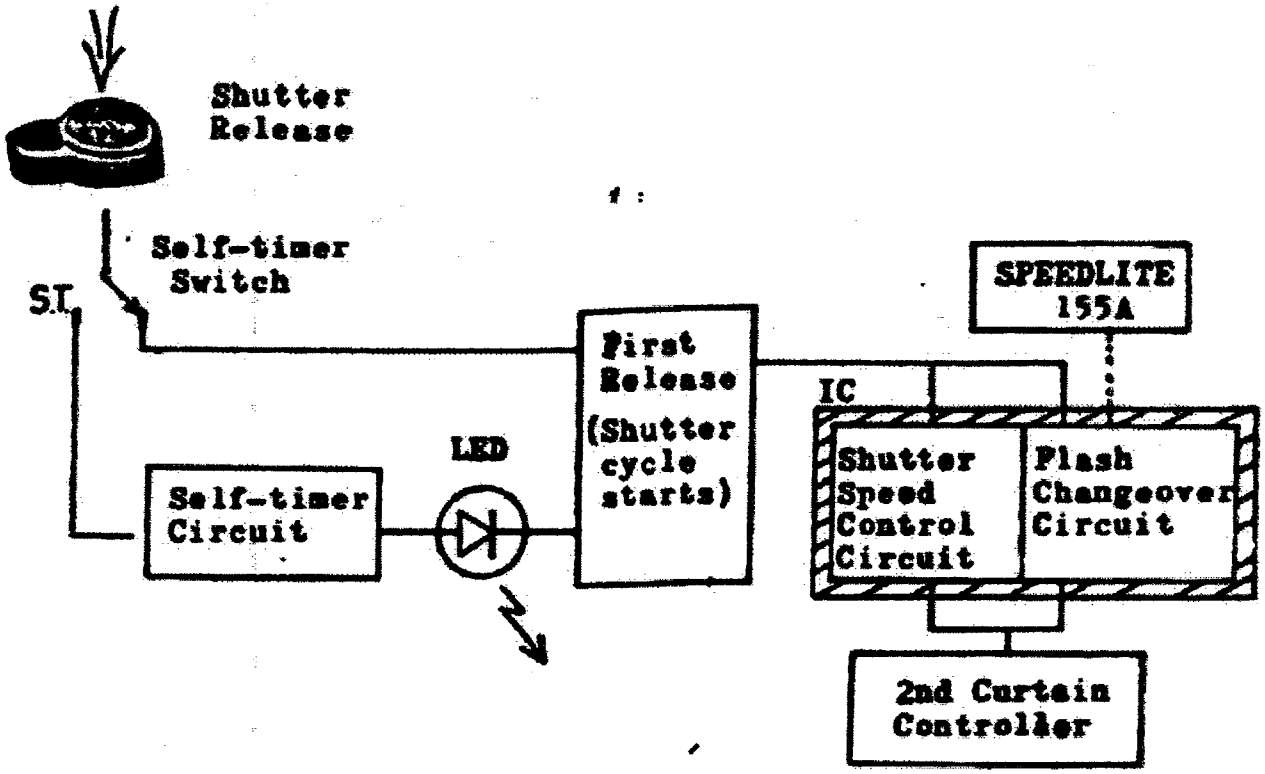


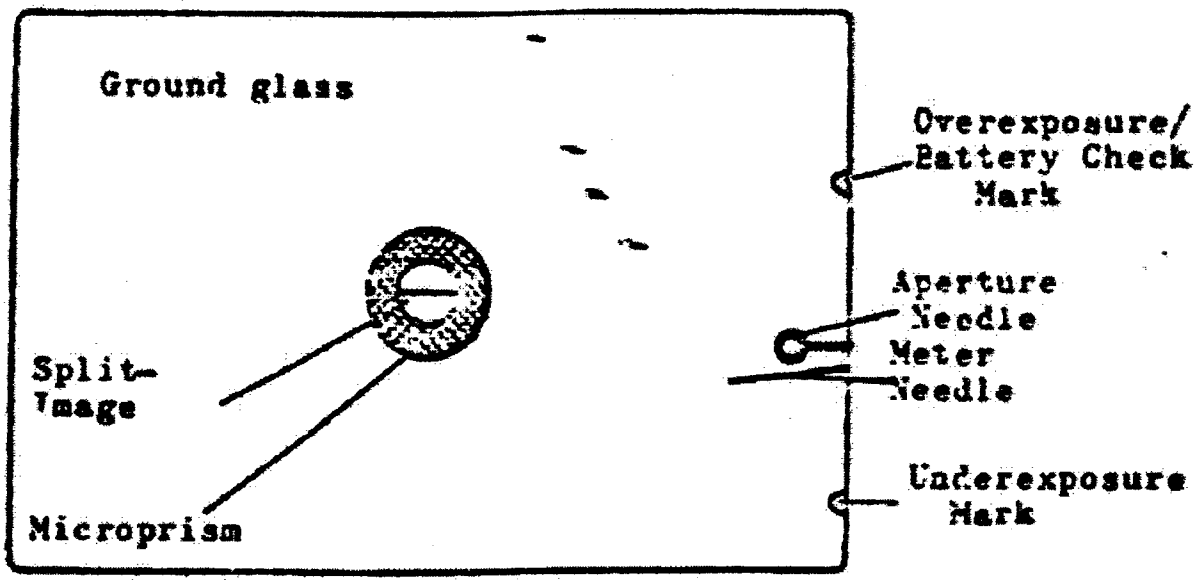
Fig. 3:

Electronic Control Circuits (Block Diagram)



(End of Shutter Cycle)

Figure 4. Viewfinder Information of AT-1



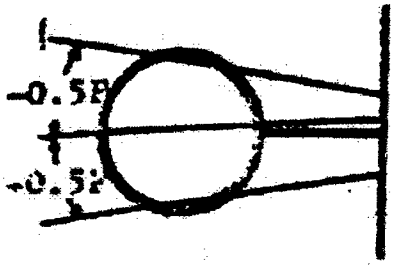


Figure 5: Optical Schematic of AT-1 with PD 50mm 1:1.3 S.C.

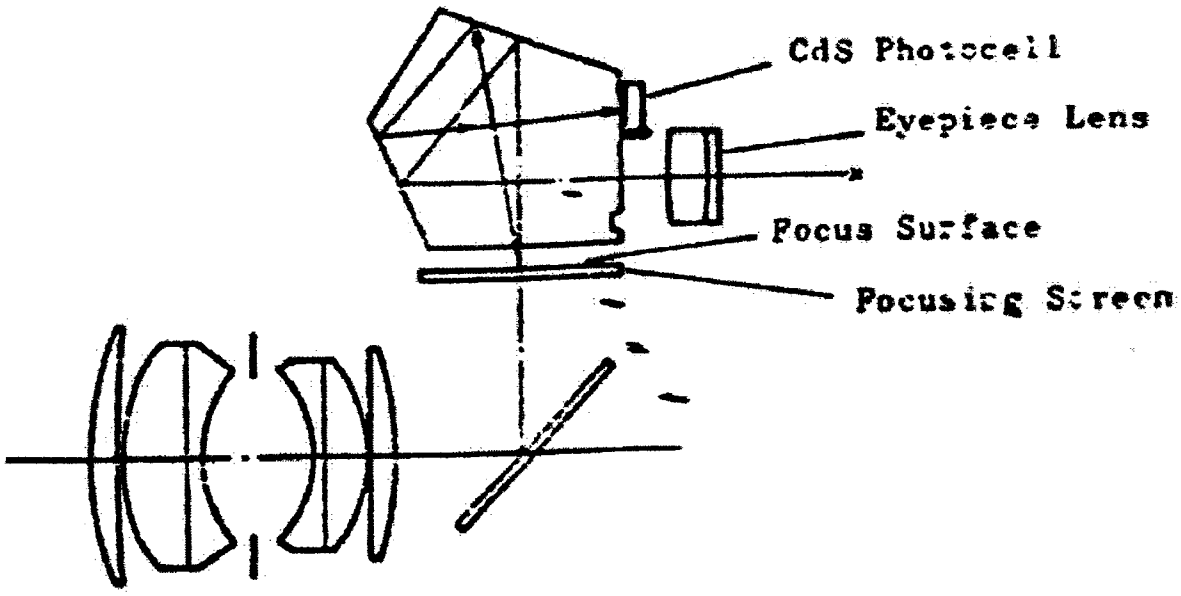


Figure 6: Sensitivity Distribution of Central Emphasis Metering

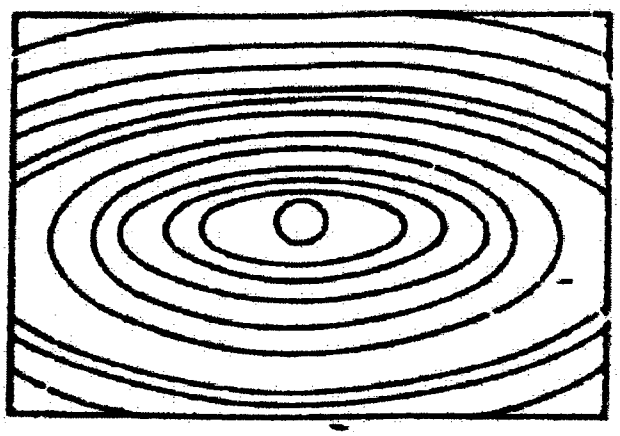


Table 1: Exposure Meter Coupling Range

EV \ F/No.	1.4	2	2.8	4	5.6	8	11	16	22
1	1	2S							
2	2	1	2S						
3	4	2	1	2S					
4	8	4	2	1	2S				
5	15	8	4	2	1	2S			
6	30	15	8	4	2	1	2S		
7	60	30	15	8	4	2	1	2S	
8	125	60	30	15	8	4	2	1	2S
9	250	125	60	30	15	8	4	2	1
10	500	250	125	60	30	15	8	4	2
11	1000	500	250	125	60	30	15	8	4
12		1000	500	250	125	60	30	15	8
13			1000	500	250	125	60	30	15
14				1000	500	250	125	60	30
15					1000	500	250	125	60
16						1000	500	250	125
17							1000	500	250

Sensitivity Limit
ASA 100 , EV 3 Line

ASA 3200 | ASA 1600 | ASA 800 | ASA 400 | ASA 200 | ASA 100 | ASA 50 | ASA 25

Shutter Speeds

* : Shutter speeds shown as marked on shutter dial.
(2S is two seconds.)

ELECTRONIC CIRCUIT

1. Low Voltage Lockout Circuit

This circuit prevents the shutter from releasing if the battery voltage is than five volts. Refer to figure 7 while reading the explanation. Numbers , other than reference symbols indicate IC pin numbers.

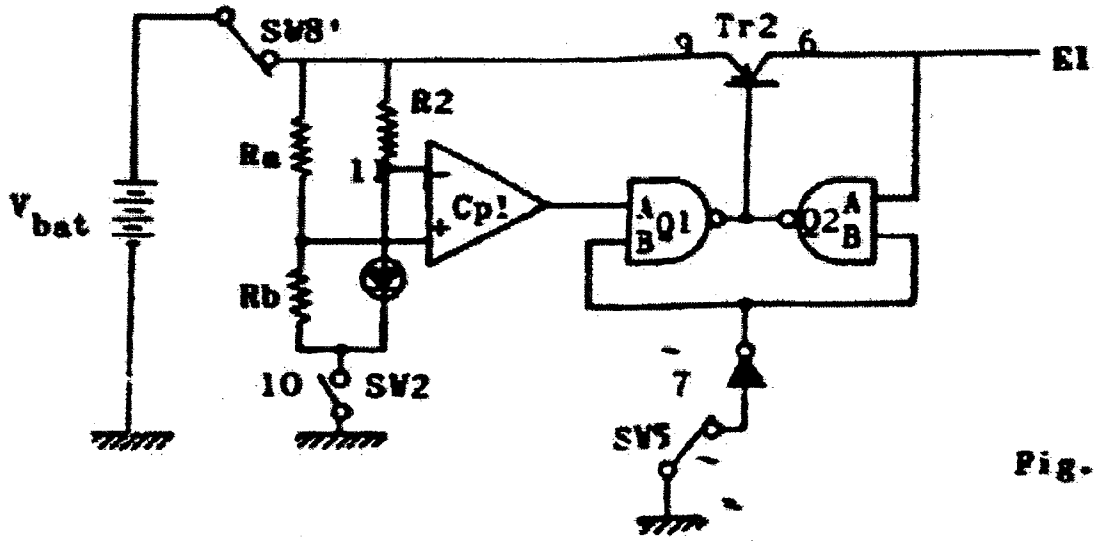


Fig. 7

LED 1 acts as a voltage regulator similar to a zener diode, therefore a set voltage, between 0 and Vbat is present whenever SW2 is closed (R2 and LED1 form a voltage divider). This LED regulated voltage is the minus (-) input to comparator Cp1. The plus (+) input to Cp1 is at the junction of voltage divider Ra and Rb. This + input varies directly with battery voltage whereas the - input is fixed. As long as the + input is higher than the - input, the output of Cp1 remains high (H) and is applied to the A input of NOR gate Q1. If the camera is wound then SW5 is closed putting a ground low (L) input on the invertor (NOT) resulting in an H output which is applied to the B input of Q1.

Two H inputs on the NOR Q1 result in a L output effecting a base bias on Tr2 turning it on. This applies the supply voltage E1 to the revelent circuits.

Turning Tr2 on puts a H input on the A input of NOR Q2 which, along with the H input already present on the B input results in a L output. Therefore, even if the shutter button is released opening SW2 and cancelling the L output from Q1, Tr2 will remain on until SW5 is opened by the 2nd curtain completeing its travel. E1 is the supply voltage for the first release circuit.

2. First Release Magnet ($Mg2$) Circuit

(It is important to remember that it is necessary to energize the electromagnet portion of the hybred magnet to release the magnet and start the exposure cycle.)

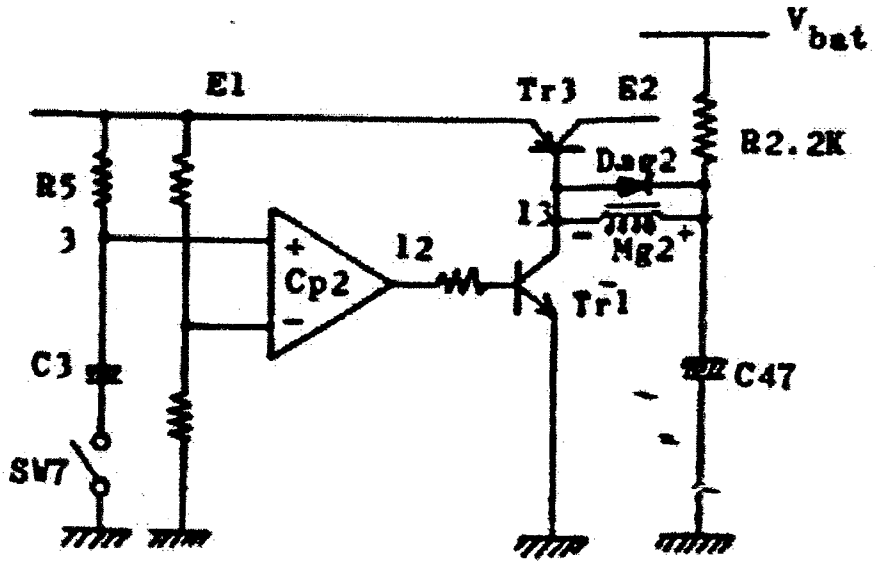


Fig. 8

Mg2 is at Vbat as soon as C47μ charges (approx. 0.1 sec.) and Mg2 - is at EL since Tr1 is off. But full E1 is now applied to the comparator Cp2 + and a somewhat lower voltage is applied to Cp2 - because of the voltage divider network. This causes a high (H) output from Cp2 which biases Tr1 on. This drops the voltage at Mg2 - allowing it to energize, releasing the permanent magnet and starting the exposure cycle. Simultaneously, current flow thru Tr1 turns on Tr3 suppling E2 voltage to the second stage circuits.

3. Self Timer Circuit

Another function of Cp2 is to provide the ten second self timer delay. If SW7 is closed when E-1 is applied the + input of Cp2 is initially lower than the - input and the output is low (L), therefore Tr1 is not turned on.

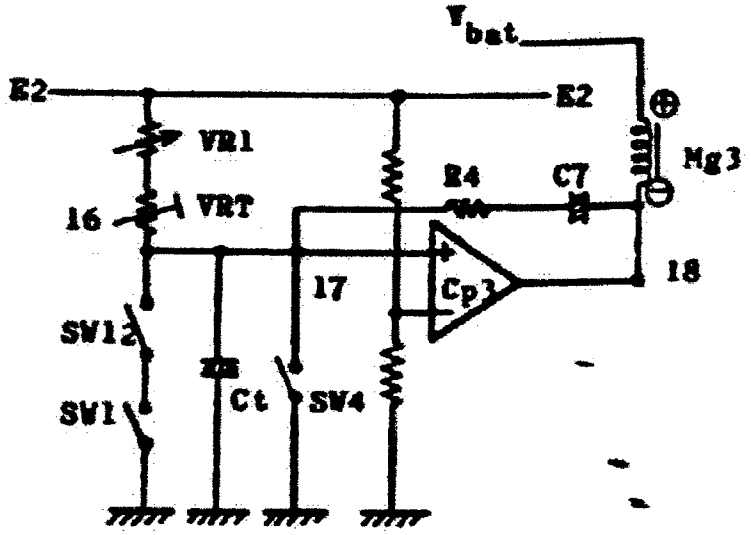


Fig. 9

As C3 charges the + input rises until it surpasses the - input level. The values of R5 and C3 are such that the delay is ten seconds.

4. Self Timer LED Oscillator

Cp4 is a square wave oscillator with alternating high (H) and low (L) outputs. These oscillations cause the self timer LED (LED2) to bling during the ten second delay time.

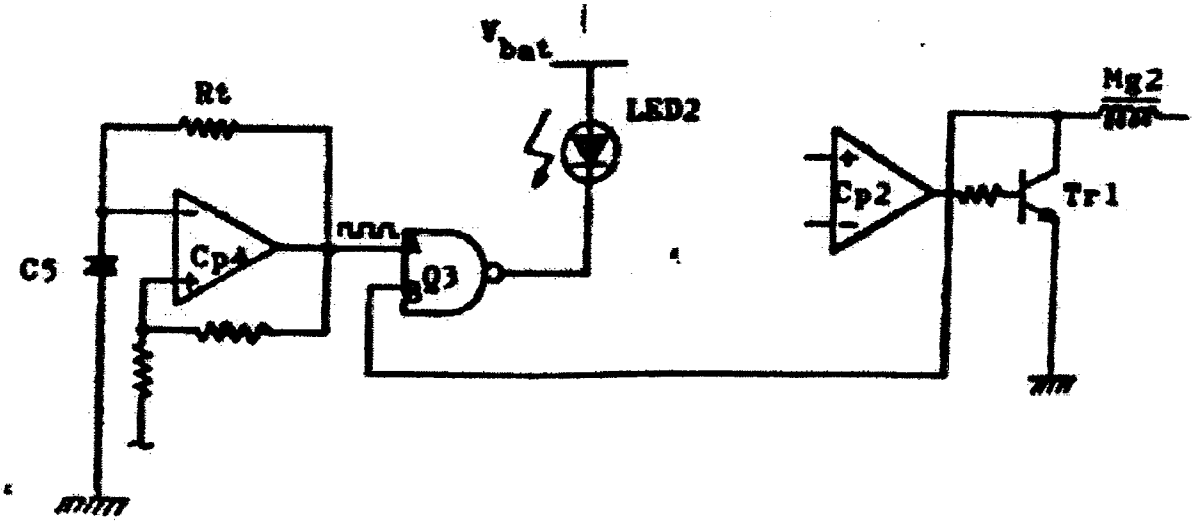


Fig. 10

A voltage is supplied to the resistor connected to Cp4 +. This voltage is greater than the voltage applied to Cp4 - which results in an H output from Cp4 (approx. +6V). This output is feed back thru Rt and charges C5. When the voltage exceeds the voltage at Cp4 + the output of Cp4 goes L and C5 discharges thru Rt until Cp4+ once again exceeds Cp4 - to cause a positive output and repeat the cycle.

As explained in section three of the electronic circuit explaination, the self timer causes a ten second delay before Trl is turned on suppling E2 and releasing the first curtain. When Trl is off, TrlC is at a high level and this H level is applied to NOR gate Q3. When Q3 A is also high due to the square wave output of Cp4, Q3 is low causing a voltage drop across LED2 making it light. When Q3 goes low, the output goes high extinguishing the LED2 until Q3 A goes high again. When the ten second delay is over Trl is turned on and Q3 B goes low so the output remains high and LED2 no longer lights.

AT-1

REF.NO. C12-1501

REPAIR GUIDE

PREFACE

This Repair Guide is issued as a part of the Service Manual of the CANON AT-1 to insure the continued high quality of the product through correct repair Procedures.

It contains five major sections, Introduction, Disassembly, Assembly and Adjustment, Troubleshooting Charts, Electrical Procedures, and Reference Charts and Diagrams. This guide be used in conjunction with the Repair Manual, General, and Service Tools sections of the Service Guide, and the AE-1 Repair Guide.

Any comments or suggestions conserning this guide will be appreciated. This guide is available only in Microfiche form.

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(Microfiche)

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CONTENTS

	Page Address
Introduction	1
AE-1 Abbreviated Table of Contents	2
1. Disassembly	4
1.1 Top and Bottom Covers	5
1.2 Electric Parts Unit	7
1.3 Film Counter Unit	9
1.4 Front Panel Unit	10
1.5 Shutter Speed Selector	11
1.6 Contact Lever Unit	11
1.7 Winding Shaft	11
1.8 Exposure Interface Unit	11
2. Assembly and Adjustment	12
2.1 Match Needle Stroke Adjustment	12
2.2 Front Panel Attachment	13
2.3 Tungsten Wire Routing	13
2.4 Match Needle Adjustment (Assembled)	14
2.5 Rope Length	15
2.6 Maximum Aperture Adjustment	16
2.7 Match Needle Projection	16
2.8 Meter Deflection	17
2.9 Meter Accuracy Adjustment	18
2.10 Battery Checker Adjustment	19
2.11 Shutter Speed Adjustments	20
2.12 High Shutter Speed Adjustment	20
3. Troubleshooting	21
3.1 Shutter Does Not Operate	21
3.2 Shutter Opens and Remains Open	23
3.3 Shutter Runs Without Opening	23
4. Electrical	25

Introduction

The Canon AT-1 (C12-1501) is the second camera using the new compact, modular, automatic assembly concept pioneered by the Canon AE-1.

It features the same electronic shutter speed, magnetic release, and automated flash synchronization switching as the AE-1, but it uses match-needle exposure determination with an extended range (three terminal) CdS rather than fully automatic exposure control with an silicon photo diode light sensor.

1. This Repair Guide covers the points of the AT-1 which differ from the AE-1. Common procedures are not included. Knowledge of the AE-1 and its Service literature, including the AE-1 Repair Guide, Repair Manual, and General sections of the Service Manual plus relevant Technical Service Guides are necessary before repair of the AT-1 is attempted.

2. Electric Parts Unit

   Ref. AE-1 Repair Guide, Introduction, Section 1

3. Soldering

   Ref. AE-1 Repair Guide, Introduction, Section 2

4. Match Needle Stroke Adjustment

   Match needle stroke adjustment of the AT-1 is one of the most important adjustments. It is not a simple adjustment. Procedures outlined in this guide should be followed exactly when making the adjustment.

5. An abbreviated AE-1 Table of Contents indication sections of the AE-1 Repair Guide which are applicable to the AT-1 is included for your convenience. Note that parts and part numbers may vary slightly between the AE-1 and AT-1. Always consult the appropriate Repair Manual for correct part numbers.

AE-1 Abbreviated Contents

(The following sections of the AE-1 Repair Guide are pertinent to the repair of the AT-1.)

		C-041 Address
Introduction		A-7
1.	Disassembly	
1.5	Winding Shaft and Shutter Unit	B-1
1.6	Mirror Box Mechanisms (Illustration only)	B-2
2.	Reassembly and Adjustment	
2.1	Sprocket	B-3
2.2	Spool	B-3
2.3	Spool Torque	B-4
2.4	Shutter Unit	B-5
2.5	2nd Curtain Magnet (Mg3) Lead Wires	B-7
2.6	Shutter Curtains	B-7
2.7	Curtain Travel Time Adjustment	B-8
2.8	Shutter Speed Adjustments (Except High Speed)	B-8
2.9	1st Curtain Brake Adjustment	B-10
2.10	2nd Curtain Brake Adjustment	B-10
2.11	Flash Synchronization	B-11
2.12	Winding Base Assembly	B-11
2.13	Winding Shaft Assembly	B-12
2.14	Winding Gear and Charge Cam Assembly	B-13
2.15	Rewind-Advance Lever Adjustment	B-13
2.16	Shutter Speed Selector Assembly	B-14
2.17	Perforation Check and Adjustment	B-14
2.18	Connection Lever Unit Installation	C-1
2.19	Connecting Lever Unit Thrust Play Adjustment	C-1
2.20	Winding Overcharge	C-1
2.21	Magnet Unit (Mg2) Assembly	C-1
2.22	Automatic Diaphragm Unit	C-2

1. Disassembly

The numbers indicate the normal sequence for removal of parts. Disassembly beyond the amount necessary to effect the necessary repairs is not recommended.

Any screws or other parts which are sealed should be re-sealed with a good quality staking compound during reassembly. (Lock-tite, Screw-lock, etc.)

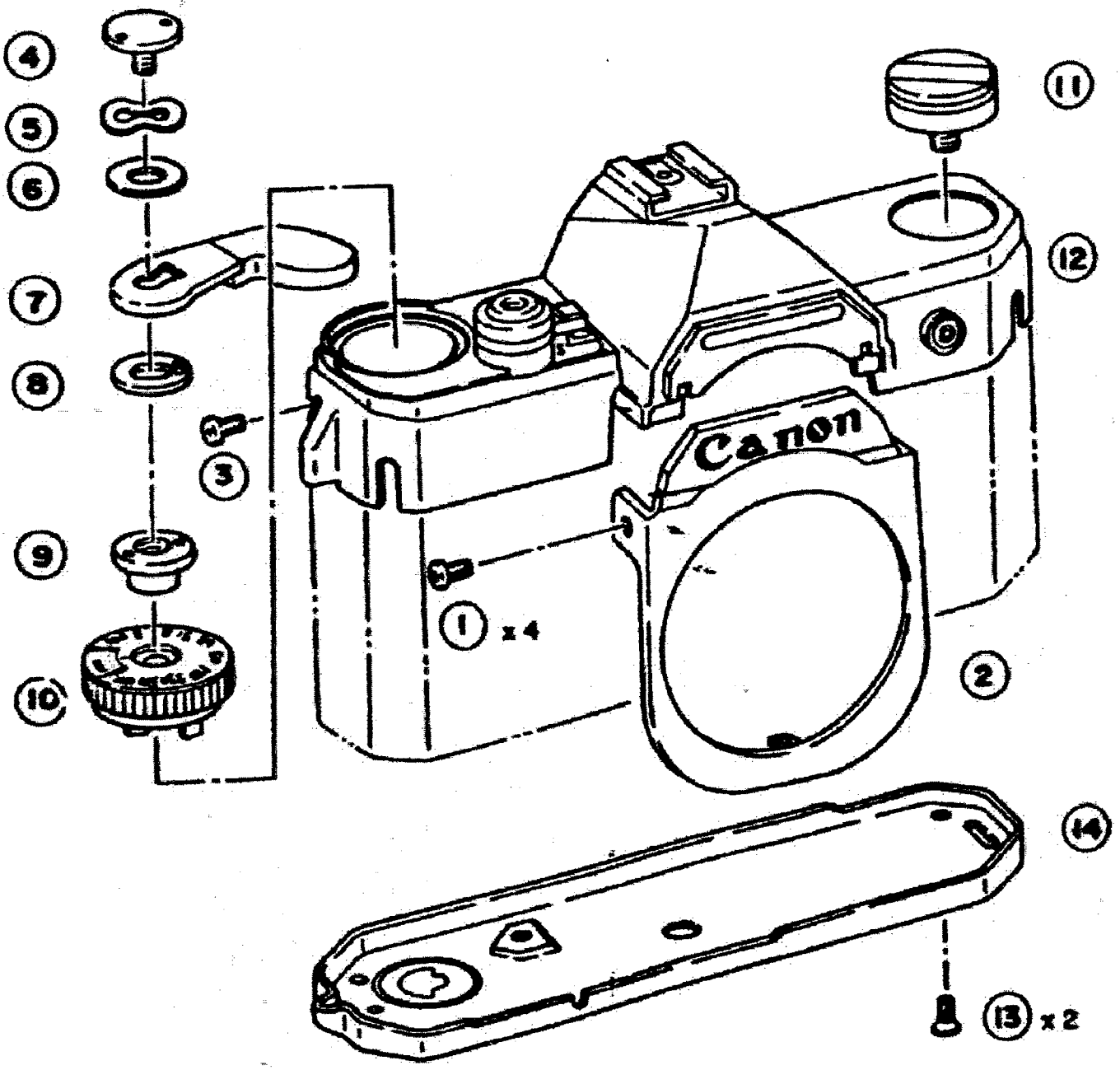
It is not necessary to remove the flex (electric parts unit) to remove the front panel or make most normal repairs.

Do not use MEK (Keton) on any plastic parts.

Part numbers are for reference only. Always consult the REPAIR MANUAL and Service Manual Reports when ordering parts. In this guide part names are listed in normal order. In the Repair Manual, most are listed in the "main noun first" order. Please use the Repair Manual order when ordering spare parts.

An asteric after a part number indicates that the part is an adjusting part. It is available in more than one size. Consult the Repair Manual for details.

1.1 Top and Bottom Covers



(1) Top Cover

1. Screw (4 ea.) X91-1736-220
2. Front panel CA1-0066-000
3. Screw (6 ea.) X91-1736-220

Set shutter dial to "B" and ASA 3200 to lessen tension, and main switch to OFF.

4. Pin Face Screw (T)
CA1-4977-000

5. Spring Washer
CA1-4982-000

6. Washer
CA1-4993-000

7. Winding Lever
CF1-1408-000

8. Winding Coupler
CF1-1479-000

9. Shutter Dial Nut*
CA1-4971-000

10. Shutter Dial
CG1-0818-000

11. Rewind Crank (T)
CG1-0815-000

(2) Base Cover

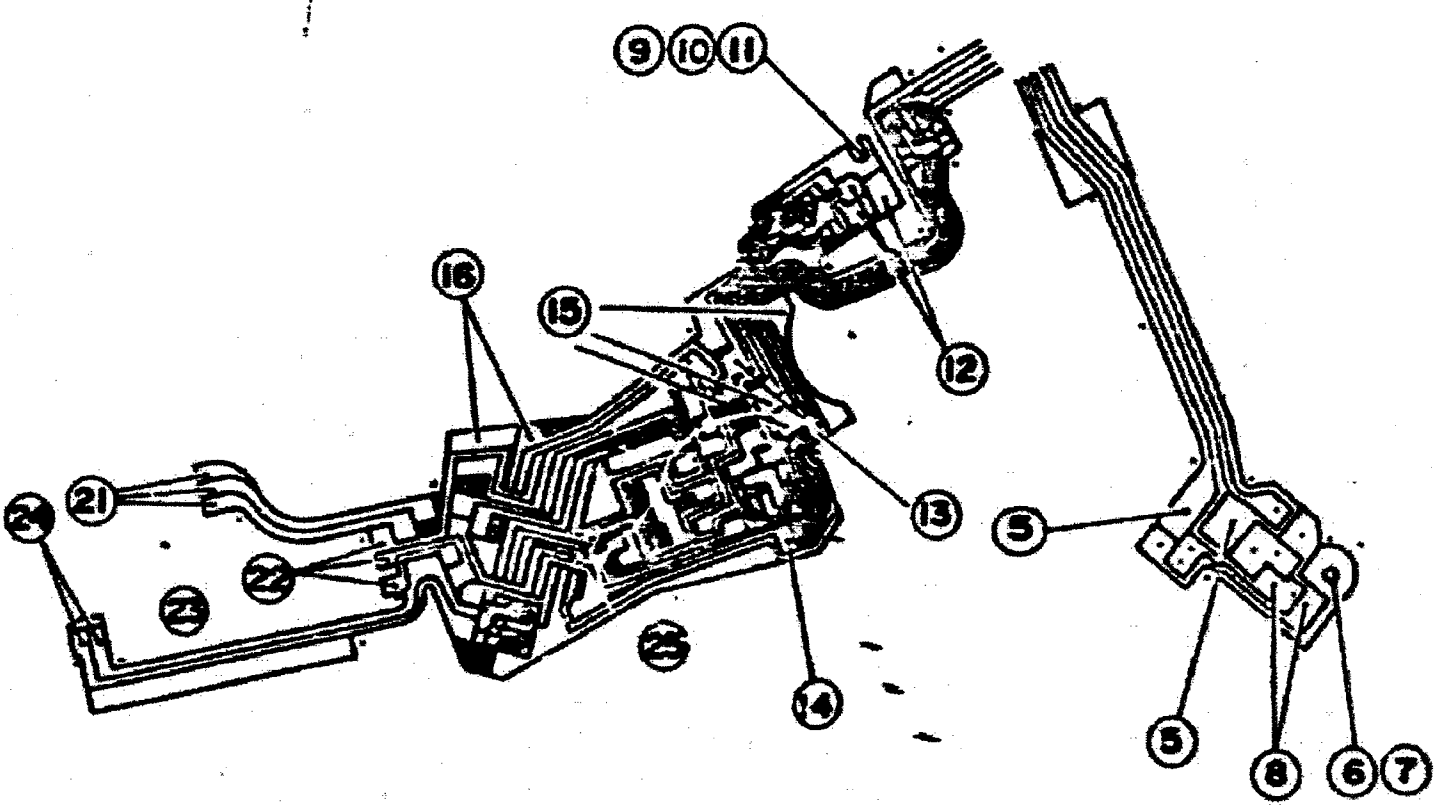
13. Screw (2 ea.)
X18-1703-060

14. Base Cover
CA1-4706-000

Notes: T: Stand-offs are available to prevent damage to flex. They mount at these positions.

*: Remove carefully to protect connecting part.

1.2 Electric Parts Unit (EPU)



NOTICE: Complete removal of the Electric Parts Unit is seldom necessary. Do not remove if not necessary.

(1) Exterior Parts

1. Leather CA1-4851-000
2. Screw (3 ea.) X18-1703-070
3. Body Cover CA1-4709-000
4. Collar CA1-5015-000

(2) Underbody Connections of EPU Flexible Circuit Board (Flex)

5. Mg3 leads (Red & Black)
6. Screw X16-2003-570
7. Washer X32-5021-XXX
8. Desolder Release Thru-hole pins

(3) Upper Body Connections of EPU Flex

9. Screw X16-2004-570 10. Delete 11. Delete

12. Desolder main switch connections

13. Meter Lead Red)

14. Flash Signal Lead (White)

15. CdS Leads (Red, Green, Black)

16. Self Timer LED (Red, Black)

17. Count Switch Screw X91-1735-370 18. Film Counter Gear CA1-4823-000

19. Screw X91-1435-XXX 20. Counter Index Plate CS1-9711-000

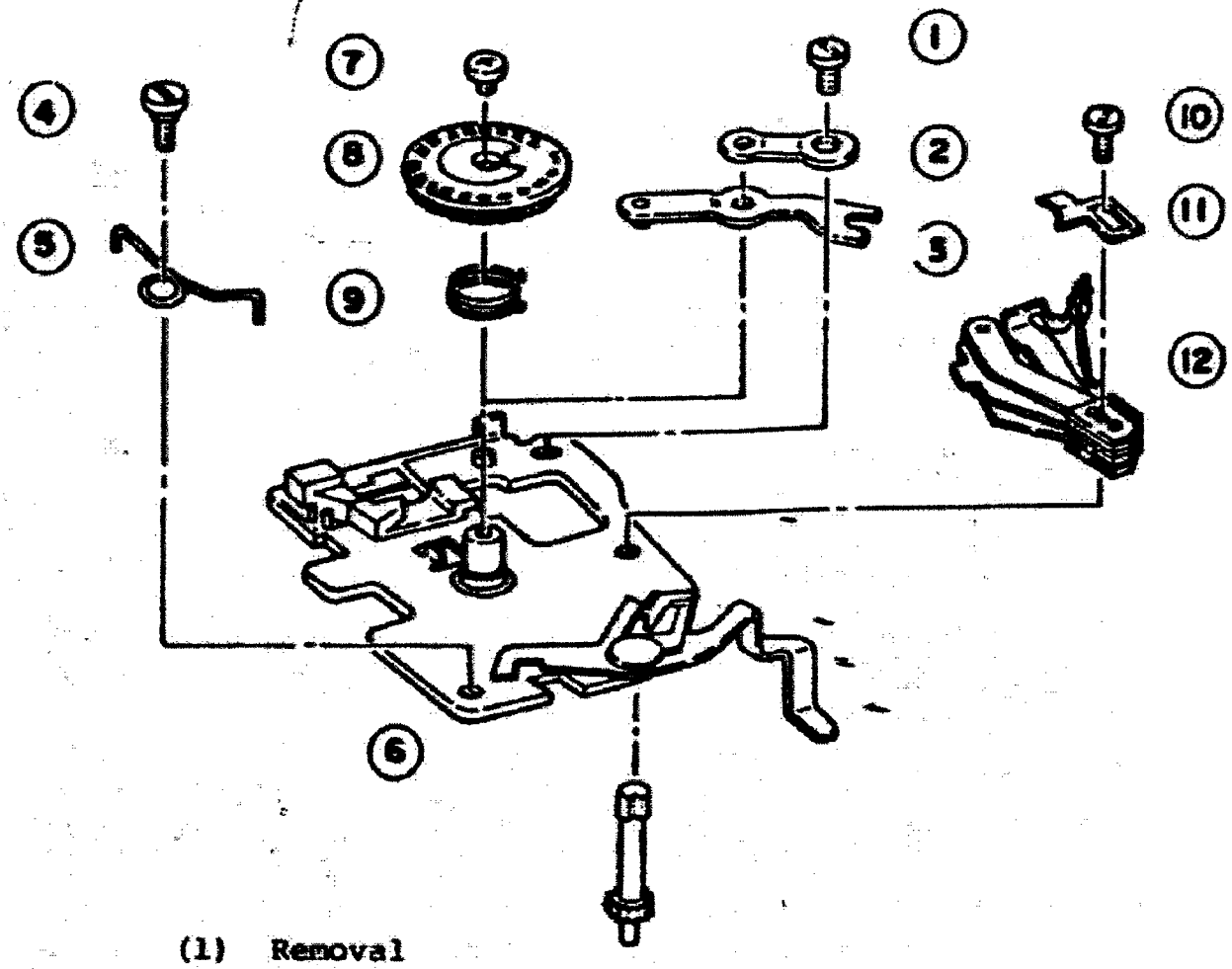
21. Desolder SW 1, 2, and 3

22. Desolder SW 5, 2', and 7

23. SW 4 Lead (Green) 24. Desolder Resistor RT

25. EPU CG1-0006-000

1.3 Film Counter Unit



(1) Removal

1. Screw X91-1736-340	2. Lever Holder CA1-5008-000	3. Slide Contact CA1-5009-000
4. Screw X96-1731-930	5. Spring CS2-6093-000	6. Film Counter Unit CG1-0816-000

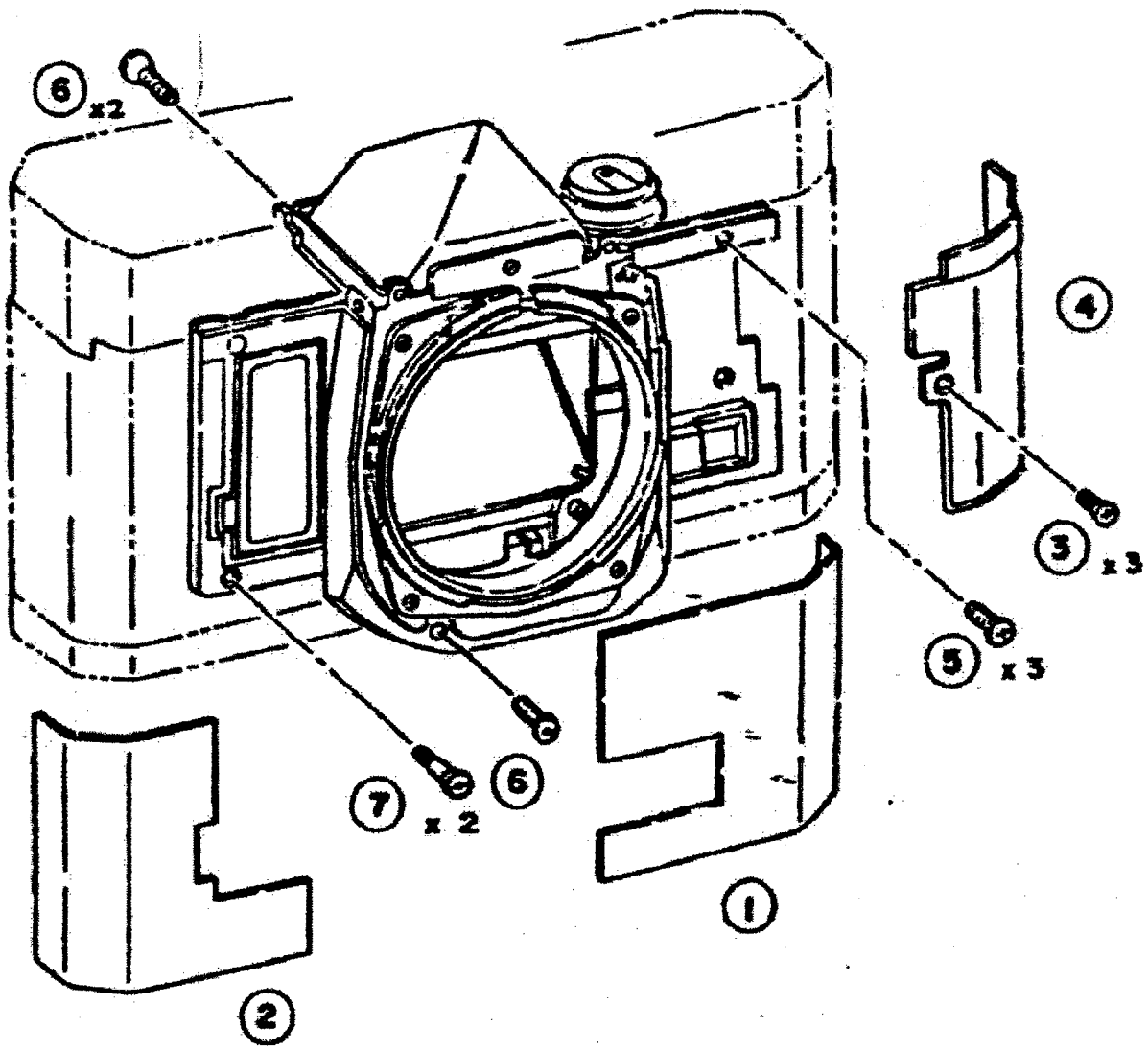
(2) Disassembly

7. Screw X91-1735-370	8. Film Counter Gear* CA1-4823-000	
9. Spring CS2-6094-000	10. Screw X91-1435-700	
11. Counter Index Plate CS1-9711-000	12. Switch Ass'y.** NPN	

*: Includes Frame Counter Disk (CS1-9710-000)

**: See Section 1.2 for soldering.

1.4 Front Panel Unit



(1) Parts Removal

1.	Leather CA1-0076-000	2.	Leather CA1-4851-000	3.	Screw (3 ea.) X18-1703-890
4.	Body Cover CA1-4709-000	5.	Screw (2 ea.) X35-2000-440	6.	Screw (3 ea.) X18-2008-080
7.	Sholder Screw (2 ea.) CA1-5012-000				

(2) Electrical Connections

When the front panel is removed without first removing the electric parts unit, unsolder the red meter lead.

1.5 Shutter Speed Selector

1. Contact Ass'y. CF1-1410-000
2. Screw, Cross-recess, PH X16-2004-070
3. Shutter Speed Selector CY1-1017-000

1.6 Contact Lever Unit

1. Screw, Cross-recess, FCH (3 ea.) X18-2004-070
2. Tripod Socket CA1-4708-000
3. G Ring X71-9750-000
4. E Ring X32-4011-720
5. Contact lever Unit CG9-2501-000
6. Collar CA1-4717-000*

1.7 Winding Shaft

1. Cover Plate CA1-4804-000
2. Spring (3 ea.) 97-5807-000
3. Roller* (3 ea.) 13-9889-000

1.8 Exposure Interface Unit

Caution: Take care not to snarl or kink the rope. When attaching unit to mirror box be sure that the alignment pin is correctly seated.

1. Screw, Cross-recess FCH (3 ea.) X18-1703-880
2. Exposure Interface Unit CG1-0001-000

2. Assembly and Adjustment

Since this camera is basically similar to the AE-1 previously introduced, common procedures previously outlined in the AE-1 Repair Guide will be ommited from this guide. The major differences are in the area of exposure determination. The film advance and shutter mechanisms are identical for practical purposes. Refer to the AE-1 Repair Guide for repair of these items.

2.1 Match Needle Stroke Adjustment

Notes: This adjustment is made with the assembled front panel. The maximum aperture correction pin should be in place and properly adjusted (See Section 2.6 of this Repair Guide).

A 1 mm pin is necessary for this adjustment.

(1) Start Position Adjustment

(a) Mount an FD 50 mm 1:1.4 lens on the assembled front panel.

(b) Align the EV3 position hole in the cam/pulley with the mole "A" in Figure 1 and install the pin to hole the position. (See alsp Figure 9)

(c) Set lens aperture at f/1.4

(d) Adjust eccentric "a" in Figure 1 so the match needle is aligned as shown in Figure 2 C"

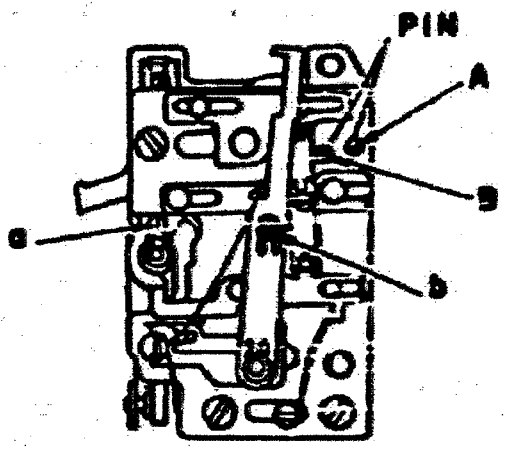


Fig. 1

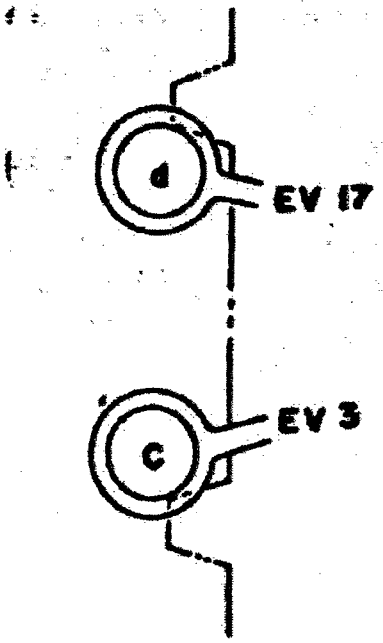


Fig. 2

(2) Stroke Adjustment

(a) Align E7 17 hole with hole "B" in Figure 1 and install pin.

(b) Set lens aperture to f/11.

(c) Adjust eccentric "b" in Figure 1 until the match needle is adjusted to position "d" in Figure 2.

(3) Repeat procedure to insure that the stroke adjustment is correct.

2.2 Front Panel Attachment

To attach the assembled front panel to the body follow this procedure.

(1) Both body and front panel should be in the released state.

(2) Set the Connecting Lever Unit (CG1-0001-000) toward the winding lever end of its stroke.

(3) REMOVE THE PIN used in the match needle adjustment.

(4) Install the front panel and secure lightly with two Screw (X95-2000-440) in the top mounting holes.

2.3 Tungsten Wire Routing

(1) Thread the wire thru the pulleys as shown in Figure 3.

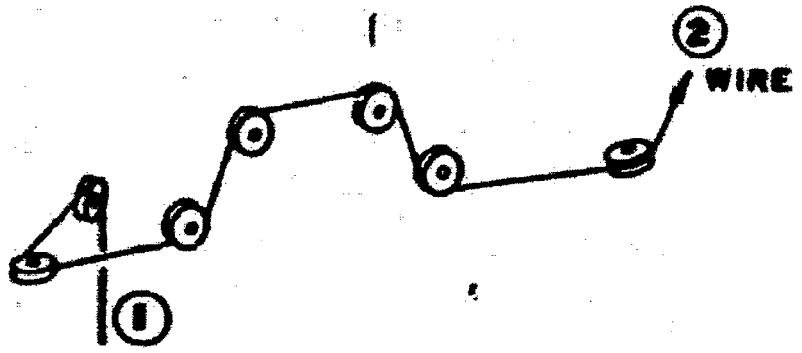


Fig. 3

(2) Set Shutter dial to ASA 3200 and "B".

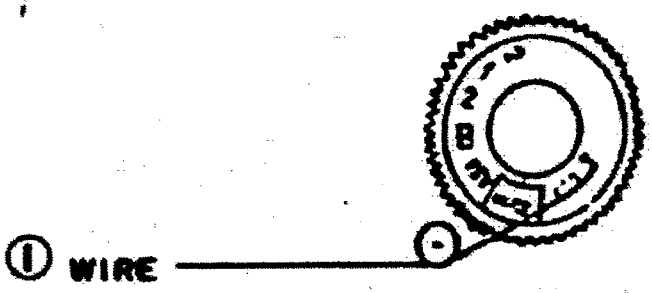


Fig. 4

2.4 Match Needle Adjustment (Assembled)

(1) Match needle start position and stroke adjustments, as outlined in section 2.1., are prerequisites for this adjustment.

(2) Adjust to position "A" in Figure 6 with the camera set to ASA 100, f/1.4 and 1/4 second.

(3) Adjust to position "B" with the camera set to ASA 100, f/11 and 1/1000 second.

(4) Adjust with the eccentric nut in Figure 5.

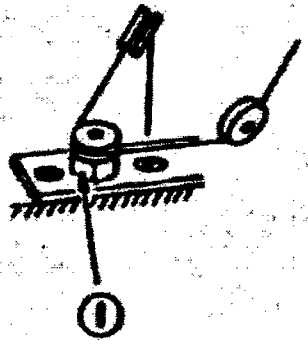


Fig. 5

Fig. 6

(5) For larger adjustments, change the anchor position of the wire on Pulley (CA1-0032-000) as shown in Figure 7.

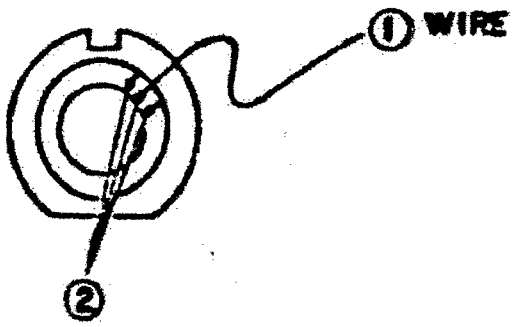


Fig. 7

2.5 Rope Length

(1) When a rope is installed, it should be cut so that it is 219 mm long between the two anchor points.

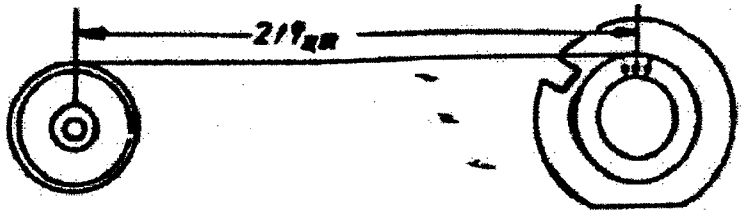


Fig. 8

(2) Tie an overhand knot in one end, install a retaining clip (CA1-0058-003) and secure in the center anchor point on Pulley (CA1-0032-000). Apply Cyanobond or other instant setting bond.

(3) Tie an overhand knot in the other end and push into the anchor slot in the cam/pulley (CA1-0040-000). Secure with a drop of Diabond or suitable strong bond.

(4) Fix the anchor slot at 45° from the vertical (aligned with the spring case screw), wrap the wire clockwise one full turn plus around the cam pulley, down around the first idler and up toward the top deck.

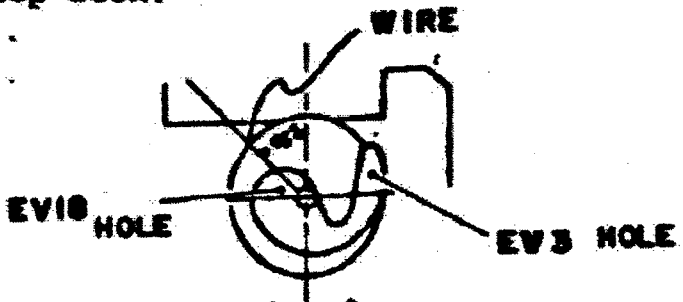


Fig. 9

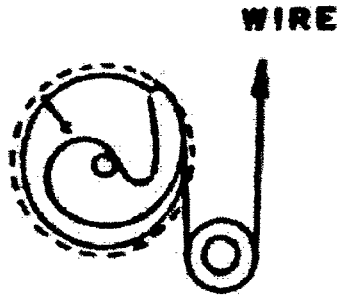


Fig. 10

(Shaft of first idler pulley faces out.)

(6) Attach the Exposure Interface Unit to the mirror box with three Screws ( ) after installing the maximum aperture correction pin.

Note: Pull the rope to insure that the match needle moves correctly, but do not pull to hard to prevent the wire from coming off of the pulley.

2.6 Maximum Aperture Adjustment

Limit: 6.9 $\pm^{0}_{0.2}$ mm below mount surface.

Except for adjustment height, adjustment is identical to AE-1. See Section 2-32 of the AE-1 Repair Guide.

Return to Section 2.3. for wire routing.

2.7 Match Needle Projection

At the low and high warning marks, the match needle should protrude into the viewfinder within the limits shown in Figure 11. At least 1/2 of the circle should be visable but not more than the amount defined by the coincidence of the inner circumference of the match needle with the corner of the warning mark. (Limit "a" in Figure 11.

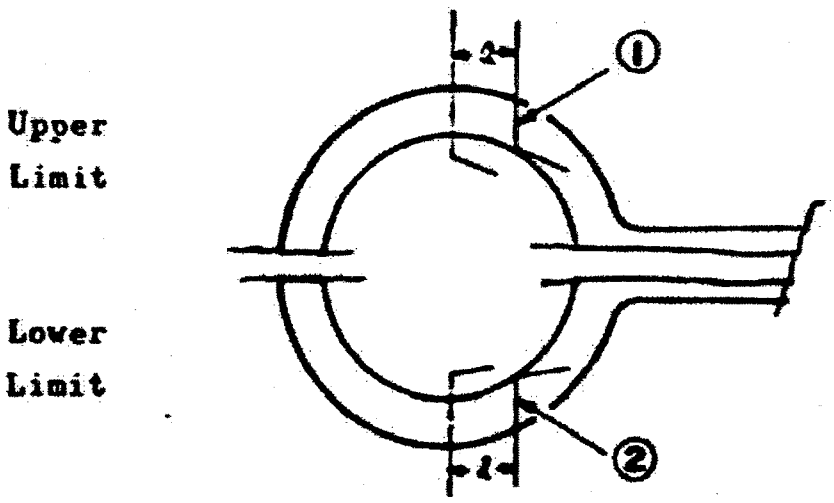


Fig. I1

Note: "B", f/1.4, for low: 1/1000, f/11 for high
ASA 100 ASA 100

2.8 Meter Deflection

(1) Normal Brightness (EV 15)

(a) Camera Settings: ASA 100, 1/1000, f/5.6

(b) Power Source: Camera Battery

(c) Control: Variable Resistor

(d) Test Equipment: Microammeter

(e) Adjust the current to 383μA ±2 μA. At this setting, the meter needle should bisect the match needle.

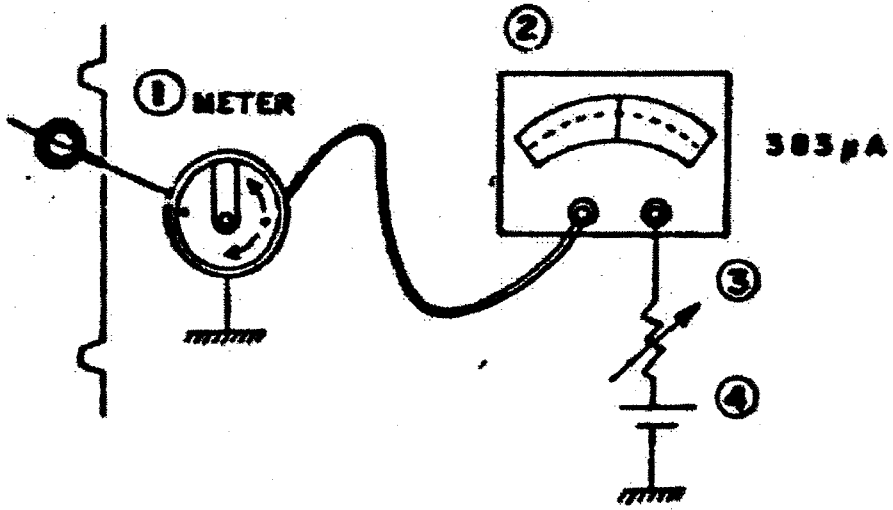


Fig. 12

(f) Adjust by turning the meter housing.

(2) Low Brightness (EV 3)

(a) Camera Settings: ASA 100, 1.4, f/1.4

(b) (c), and (d): As above

(e) Adjust microammeter to between 31 and 41 uA. At this setting, at least the lower portion of the match needle, and not more than the complete needle should be within the lower warning mark, as shown in Figure 13.

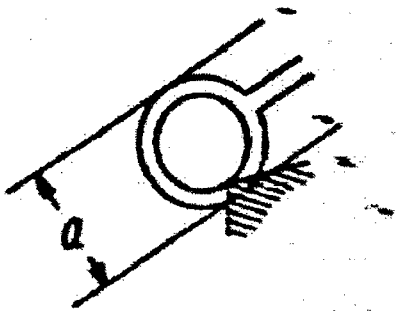


Fig. 13

2.9 Meter Accuracy Adjustment

(1) At the points indicated in the table below, adjust the meter needle so that it bisects the match needle.

(2) Power supply voltage should be 6.35 ±0.02 V for this test.

Common Conditions: ASA 100, Aperture f/5.6, Meter K: 12.5

EV	Shutter Speed	Brightness (nt)	Limit*	Adjustment
9	1/15	64	0.6P	CdS ND Filter
12	1/125	512	0.6P	VR 2
15	1/1000	4096	0.8P	VR 3

* : Limit is for total system error using EV tester, not for meter needle only.

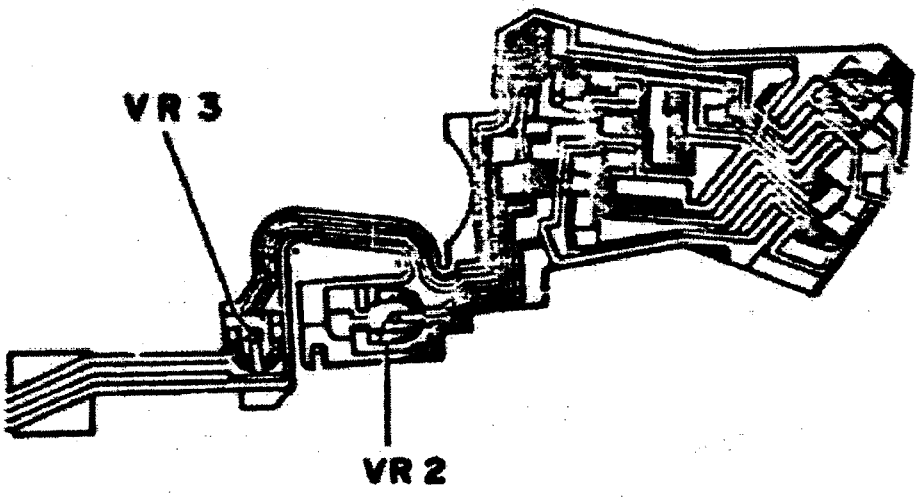


Fig. 14

2.10 Battery Checker Adjustment

(1) Set the low voltage power supply to 4.2 ±0.05 V.

(2) Turn the battery checker ON.

(3) The meter needle should align as shown in Figure 15.

(4) Adjust VR 4, shown in Figure 16.

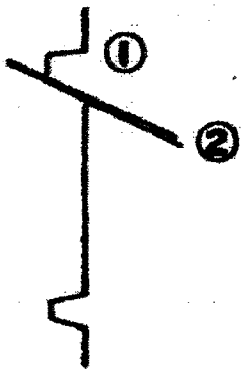


Fig. 15

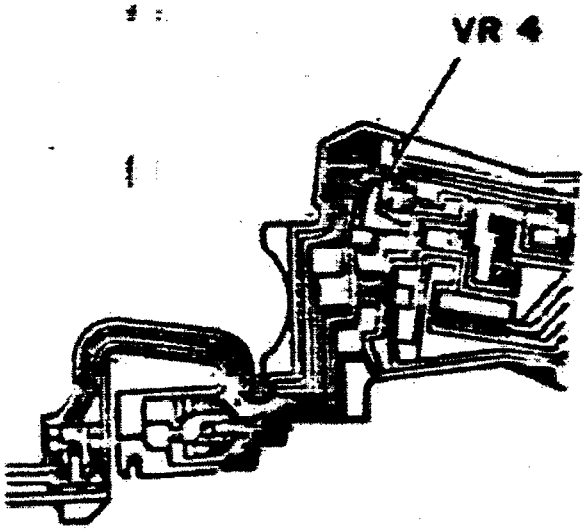


Fig. 16

2.11 Shutter Unit Adjustments

Refer to the AE-1 Repair Guide for shutter adjustments, with the exception of the high shutter speed adjustment.

2.12 High Shutter Speed Adjustment

Adjust the high shutter speeds with VR 1. High Shutter speed adjustment must be preceeded by the curtain speed and slow speed adjustments.

Note: Mg3 must be clean and correctly aligned to insure proper shutter operation.

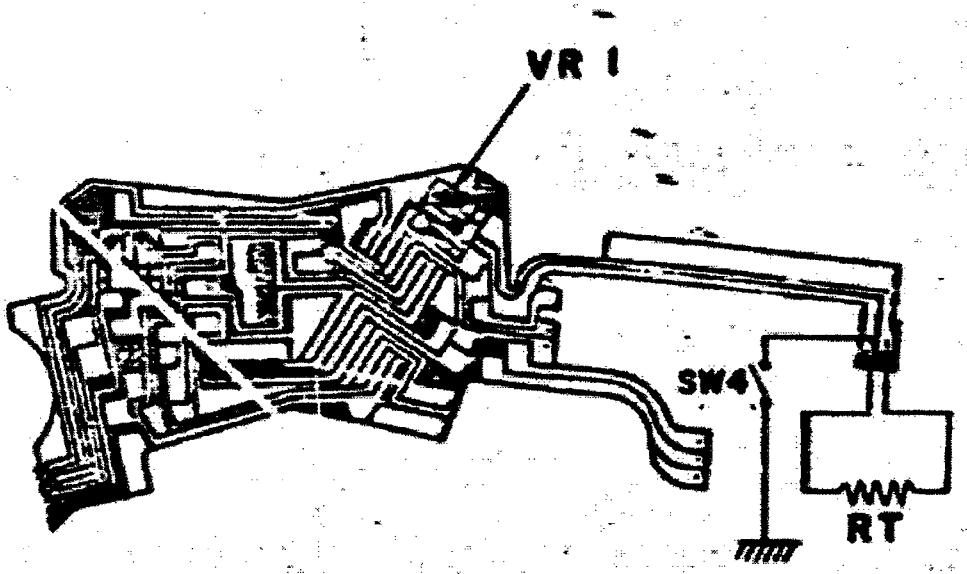
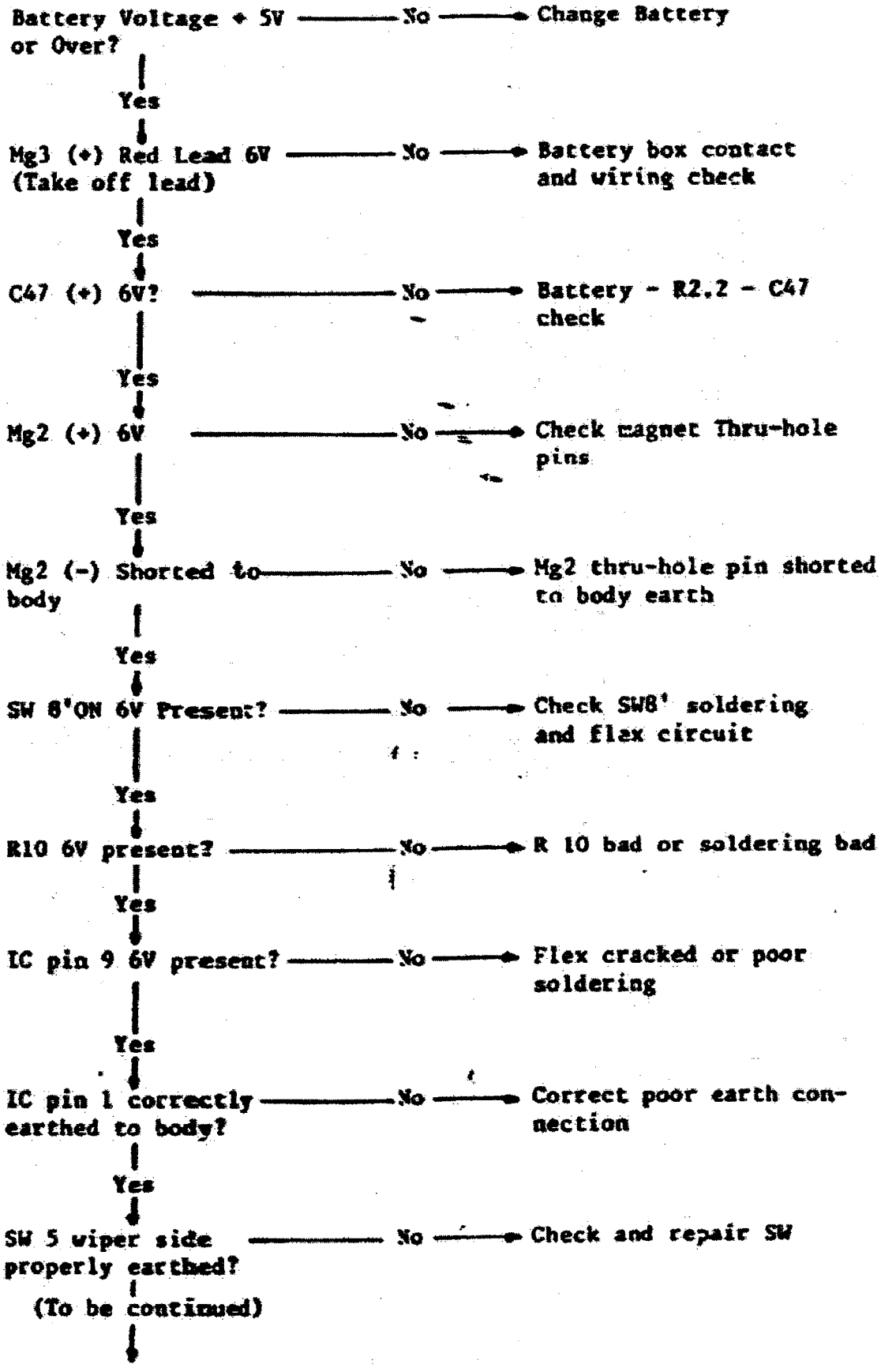
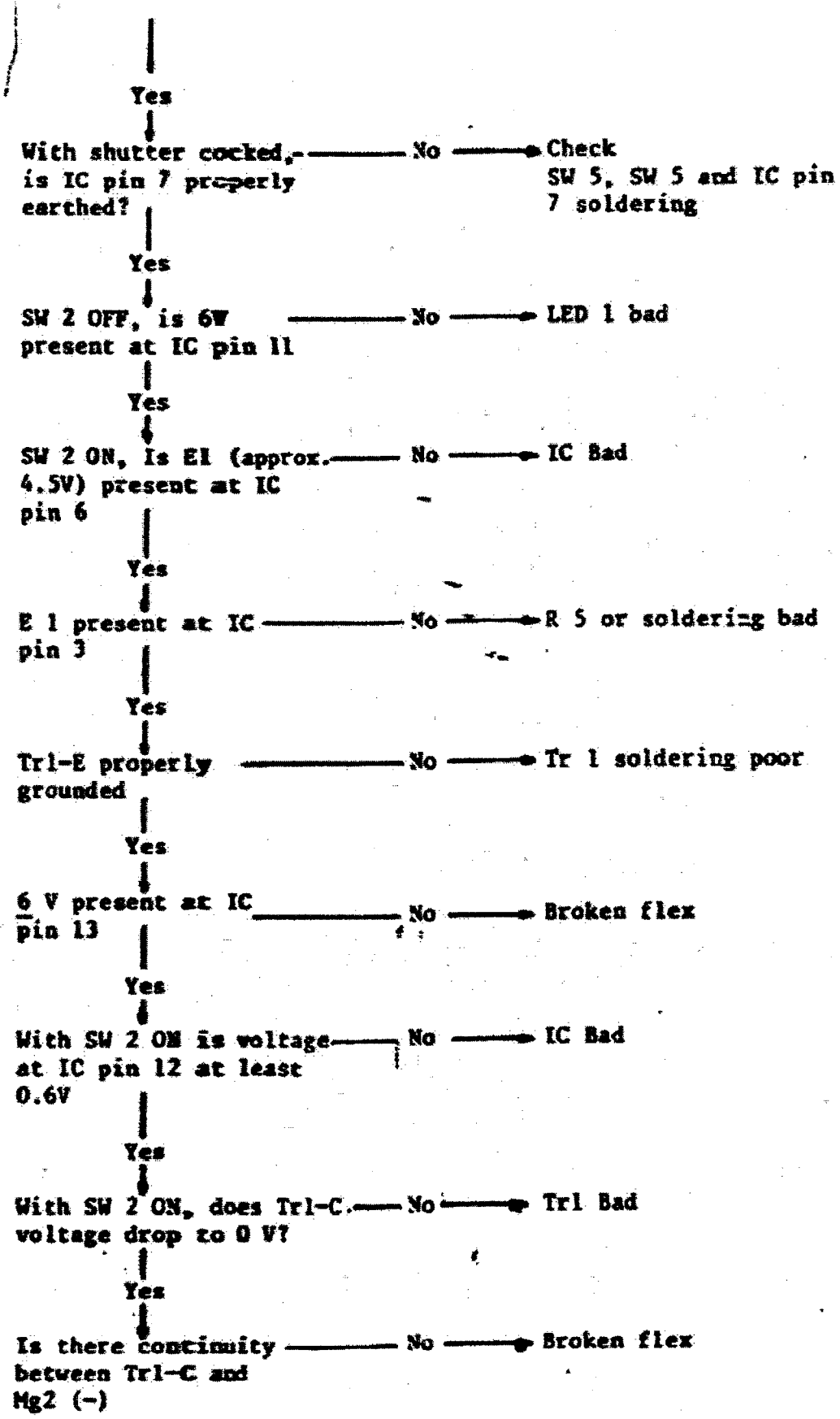


Fig. 17

3. Troubleshooting

3.1 Shutter Does Not Operate




Yes
With shutter cocked, is IC pin 7 properly earthed?
No
Check SW 5, SW 5 and IC pin 7 soldering
Yes
SW 2 OFF, is 6V present at IC pin 11
No
LED 1 bad
Yes
SW 2 ON, Is E1 (approx. 4.5V) present at IC pin 6
No
IC Bad
Yes
E 1 present at IC pin 3
No
R 5 or soldering bad
Yes
Tr1-E properly grounded
No
Tr 1 soldering poor
Yes
6 V present at IC pin 13
No
Broken flex
Yes
With SW 2 ON is voltage at IC pin 12 at least 0.6V
No
IC Bad
Yes
With SW 2 ON, does Tr1-C voltage drop to 0 V?
No
Tr1 Bad
Yes
Is there continuity between Tr1-C and Mg2 (-)
No
Broken flex

3.2 Shutter Opens and Remains Open

Continuity between IC pin 16 and VR 1 — No → VR 1 soldering

↓ Yes

Continuity between IC pin 16 and RT thru-hole pins? — No → Broken flex

↓ Yes

Is resistor RT shorted to body? — Yes → Correct short or replace RT if bad

↓ No

Is count switch (SW4) shorted to body — Yes → Poor soldering or short thru click spring

↓ No

Is there continuity between IC pin 17 and RT thru-hole pins? — No → Flex broken

↓ Yes

Poor contact of shutter speed resistor RT → Check by shorting RT in and out thru-hole pins. If 2nd curtain magnet (Mg3) releases, RT contact is bad.

3.3 Shutter Curtains Run Without Opening

6V present at minus (-) side of Mg3? — No → Mg3 coil open or wiring bad

↓ Yes

Short Mg3 (-) to body earth. Mg3 operates properly? — No → Mg3 yoke and armature scratched, dirty or not properly aligned.

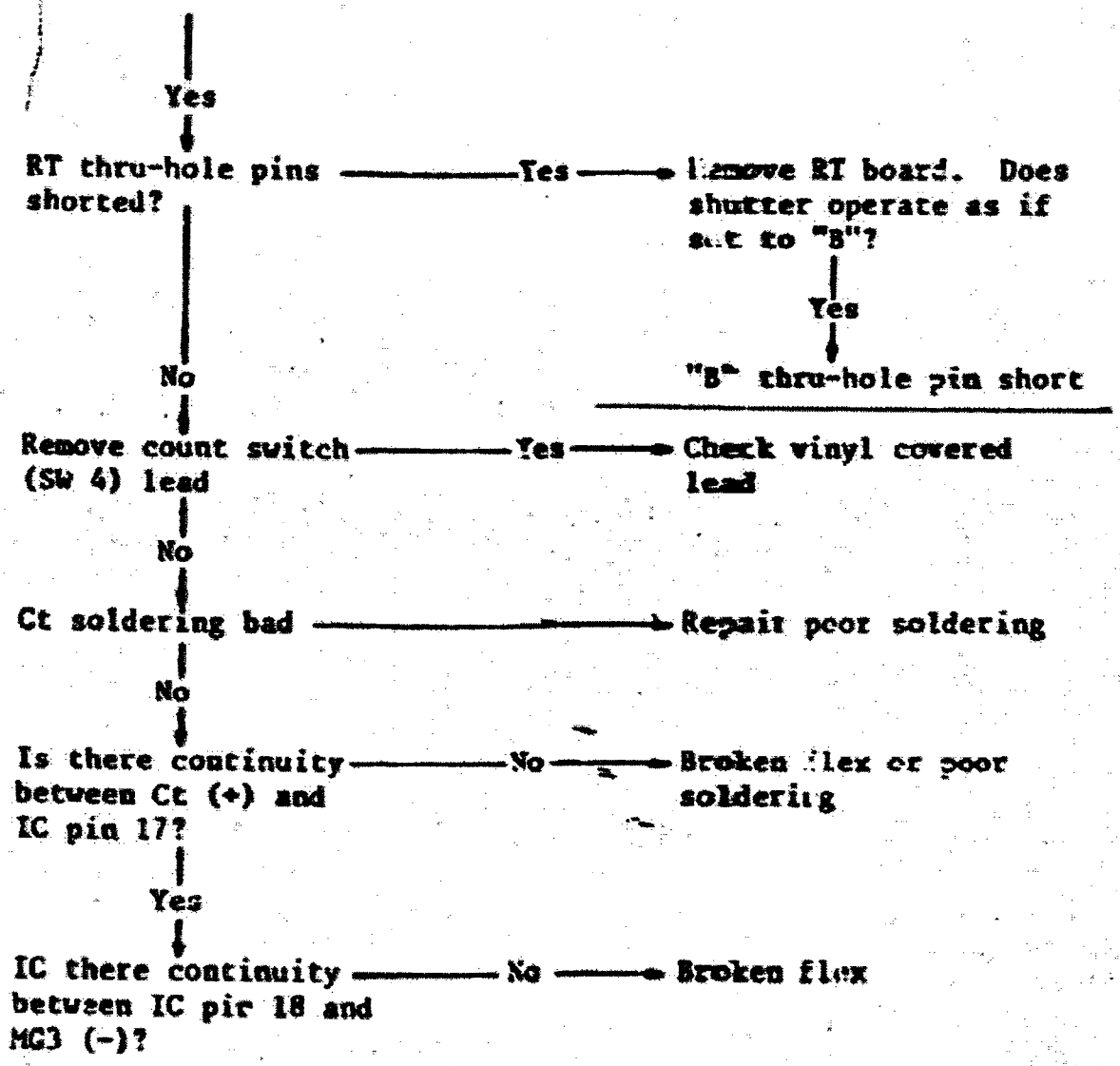
↓ Yes

Is Mg 3 holding strength at least 180g — No → Yoke and armature not properly aligned

↓

(To be continued)

↓


Yes
RT thru-hole pins shorted?
Yes
Remove RT board. Does shutter operate as if set to "B"?
Yes
"B" thru-hole pin short
No
Remove count switch (SW 4) lead
Yes
Check vinyl covered lead
No
Ct soldering bad
Repair poor soldering
No
Is there continuity between Ct (+) and IC pin 17?
No
Broken flex or poor soldering
Yes
IC there continuity between IC pir 18 and MG3 (-)?
No
Broken flex

1. Switches

SW 1: Bulb Hold

SW 2: Shutter Release

SW 4: Count

SW 5: Shutter Cocked/Released

SW 5': Power Winder Enable

SW 7: Self Timer

SW 8: Battery Checker

SW 8': Main Switch

SW 12: Bulb Sw.

2. LED's

LED1: Battery Check Indicator

LED2: Self Timer

3. Variable Resistors

VR1: High Shutter Speed Adj.

VR2: Mid Shutter Speed Adj.

VR3: High Brightness Adj.

VR4: Battery Checker Adj.

4. Electromagnets

Mg2: Release Mag.

Mg3: 2nd Curtain Maghet

5. Capacitors

C_t (1 μF): Shutter Timing

C47 (47 µF): Release

C3 (10 µF): Self Timer 10 sec.

C4 (0.33 µF):

C5 (33 µF): Self Timer LED

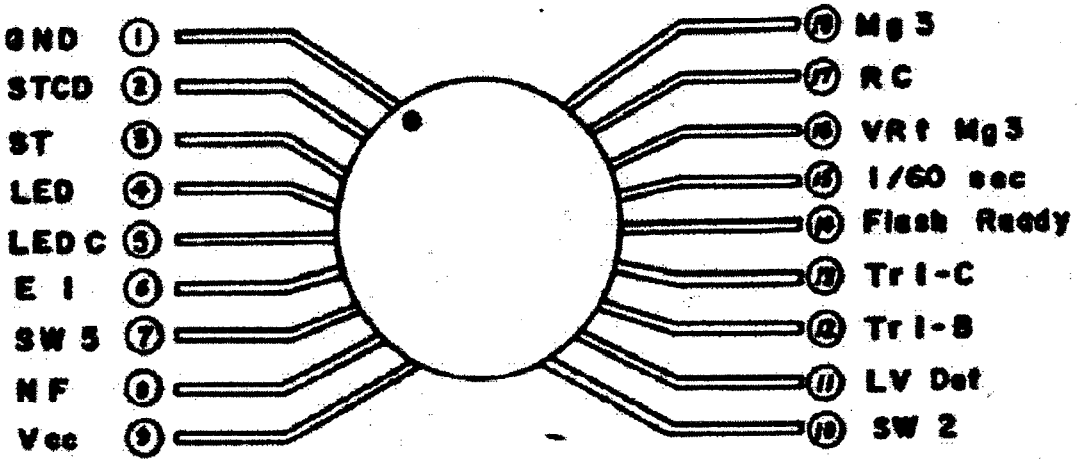
C6 (0.33 µF): Noise Filter

C7 (0.1 µF):

Tr1 (L6) Release Control

Note: Effort has been made to use the same symbol number for parts with the same function in both the AE-1 and AT-1. Therefore symbol numbers do not always occure in sequence.

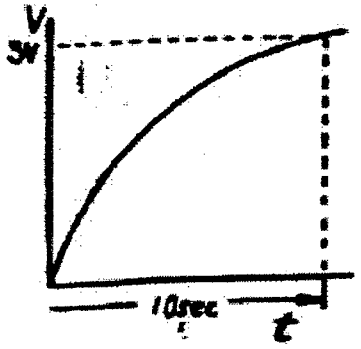
IC Pin Connections



1. GND: Circuit Ground (earth) 0V

2. STCD: Self Timer Capacitor Dumper
(During continuous self timer operation, an internal transistor in parallel with C3 conducts momentarily when E1 is first generated.
This discharges C3 so that it is ready for the next timing cycle.

3. ST: Self Timer comparator Input
During normal operation: 3.7V
present from SW2 ON till SW5 OFF



Self Timer Operation
RC circuit causes above waveform.
Hybred magnet (Mg2) is deactivated at 3V.

4. LED: LED control. When LED is operating, voltage fluctuates around 3V. When LED is not operating, voltage is 4V.

5. LED C: LED oscillator capacitor connection. 1V during operation.

6. El: SW 2 ON: 4.5V
SW 5 OFF: 0V

9. VCC: Battery Supply Voltage

10. SW 2: SW 2 ON pin 10 is at Ground

11. LV Det: Low Voltage Comparator Input SW 8' ON: Approx. IV

12. Trl-B: SW 2 ON: 0.8 - 0.6V
SW 5 OFF: 0V

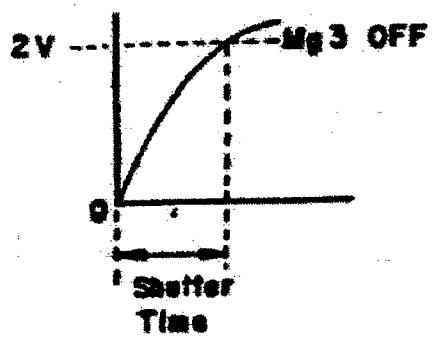
13. Trl-C: SW 2 ON: 0V
SW 5 OFF: _.2V

14. Flash Ready: Signal (GND) which switches RC variable resistors (pin 16) to 1/60 resistor (pin 15)

15. 1/60 sec.: Normally: 0V, Flash Ready: 4V

16. VRt Mg3: Shutter speed resistors

17. RC: Shutter Speed Comparator Input from RC Circuit



18. Mg3: Shutter Speed Comparator Output to control 2nd curtain magnet (Mg3)

AT-1 Functional Sequence

(1) When main switch (SW 8') is turned on battery voltage (Vcc) is applied.

(2) When the mechanism is wound (film advanced) the power winder enable switch (SW 5') is opened and the shutter cocked/ready switch (SW 5) is closed.

(3) When the release switch (SW 2) is closed, ground is provided for the low voltage comparator circuit (R2, LED1 and part of the IC). If the battery voltage is sufficient (5V), and SW 5 is closed,

(4) An internal transistor in the IC is turned on and E1 (1st release supply voltage) is present at pin 6 of the IC.

(5) In normal operation E1 is applied instantly thru R5 (1MΩ) to pin 3 (a comparator input) of the IC,

(6) For self timer operation, SW 7 is closed and R5 and C3 form a 10 second delay circuit before the input is applied to the comparator.

(7) Tr-1 is turned on by the comparator output (pin 12) applied to its base.

(8) This effectively grounds the end of electromagnet coil of the hybred magnet (Mg2). The charge stored on C47μ is discharged thru the magnet coil. The coil of the hybred permanent/electromagnet causing a cancelling flux, releasing Mg2 which starts the shutter sequence.

(9) The ground at pin 13 also turns on the second internal transistor and E2 (shutter timing supply voltage) is available and applied to the negative input of the comparator whoes output is pin 18 of the IC.

(10) The comparator output (pin 18) goes low and current flows thru Mg1 latching the 2nd curtain.

(11) The shutter sequence started by the release of Mg2 requires approximately 40 mS before the 1st curtain actually starts running. When it starts the count switch (SW 4) opens.

(12) The opening of SW 4 removes the short across Ct (the shutter timing capacitor) and it starts to charge thru the shutter timing resistors VR1 and VRt.

(13) As Ct charges to the predetermined level the + input (pin 17) to the comparator goes positive and the output (pin 18) goes high reducing the potential difference across Mg3 deenergizing it and allowing the 2nd curtain to run ending the exposure.

(14) When the 2nd curtain reaches the end of its travel it opens SW 5 and closes SW 5'. Opening SW 5 removes E1 (and E2) deactivating the shutter related circuits.

(15) Closing SW 5' applies a ground the power winder curcuit, if one is attached, allowing it to wind the firm and cock the shutter which returns the sequence to step no. 2.

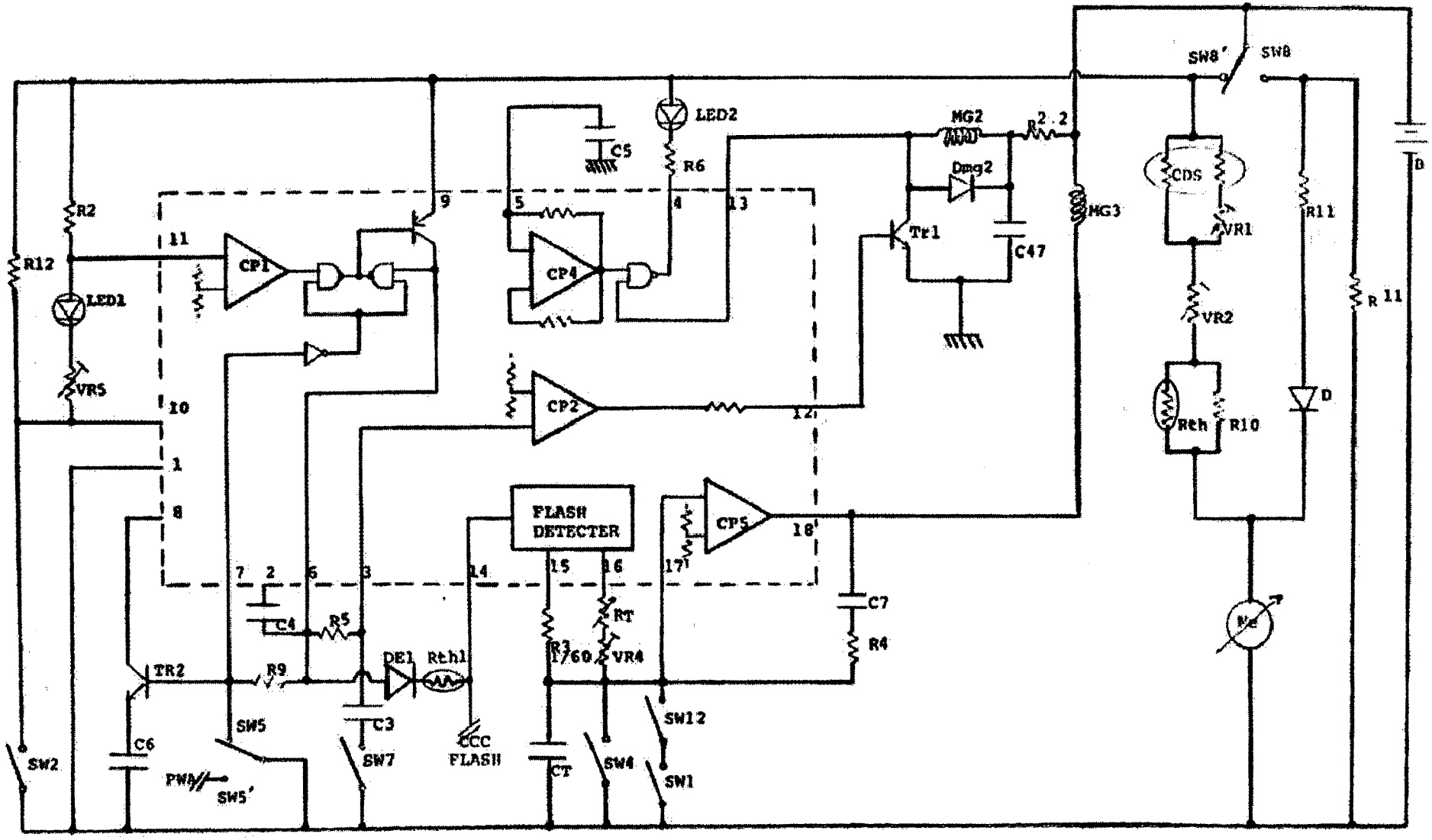
SPEEDLITE 155A Operation Step

12A. If the 155A is mounted and charged, a control signal (ground) is applied at pin 14 of the IC. When SW 4 opens the current to charge Ct flows thru the fixed (1/60 sec.) from pin 15 rather than thru the variable shutter speed resistors from pin 16.

CANON AT-1

SCHEMATIC DIAGRAM (1ST. 2ND TYPE)

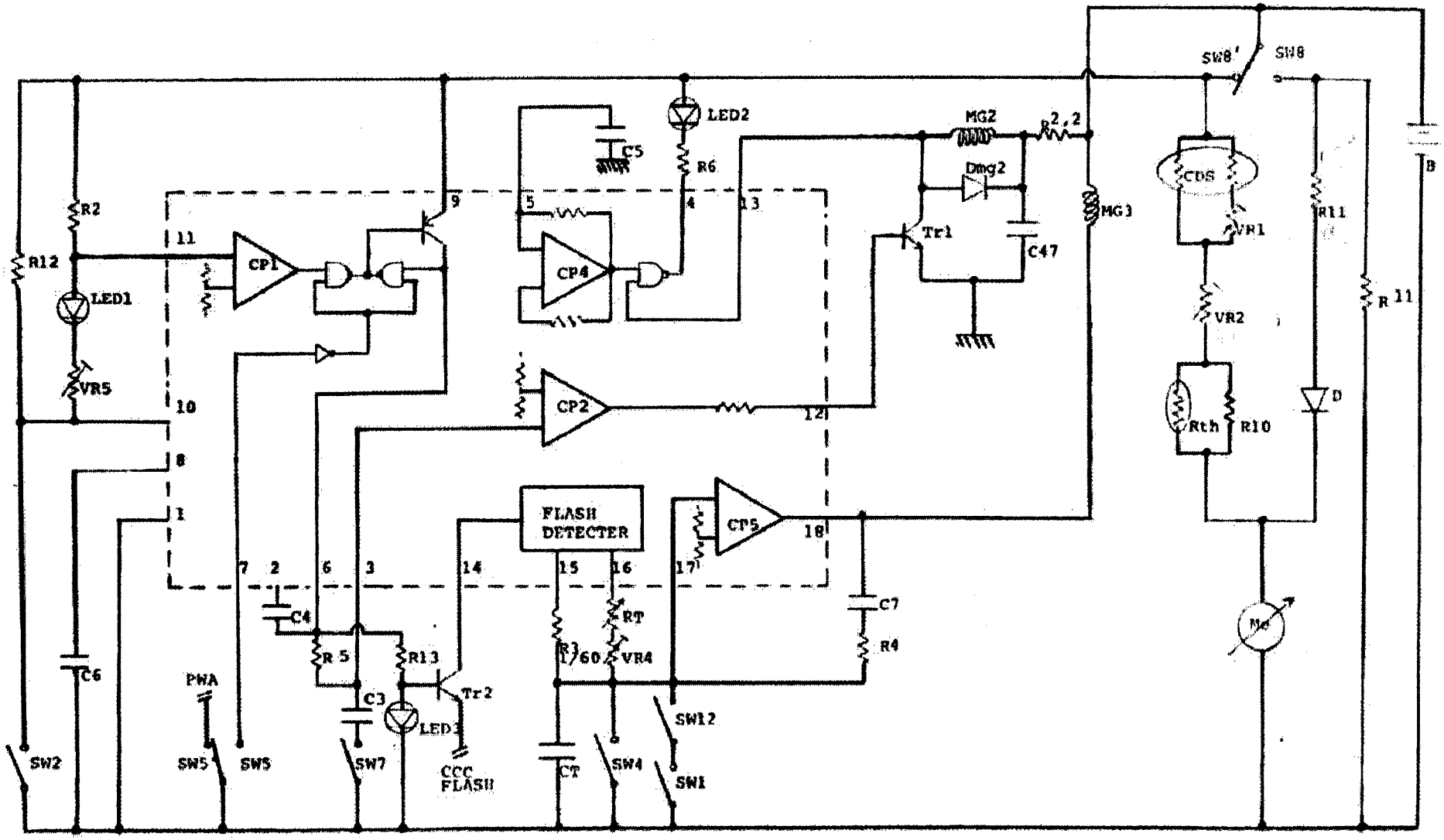
SW1 : BULB HOLD SWITCH
SW2 : RELEASE SWITCH
SW4 : COUNT SWITCH
SW5 : SHUTTER COCKED/READY SWITCH
SW5' : POWER WINDER ENABLE SWITCH
SW7 : SELF TIMER SWITCH
SW8 : BATTERY CHECKER switch
SW8' : MAIN SWITCH
SW12 : BULB SWITCH



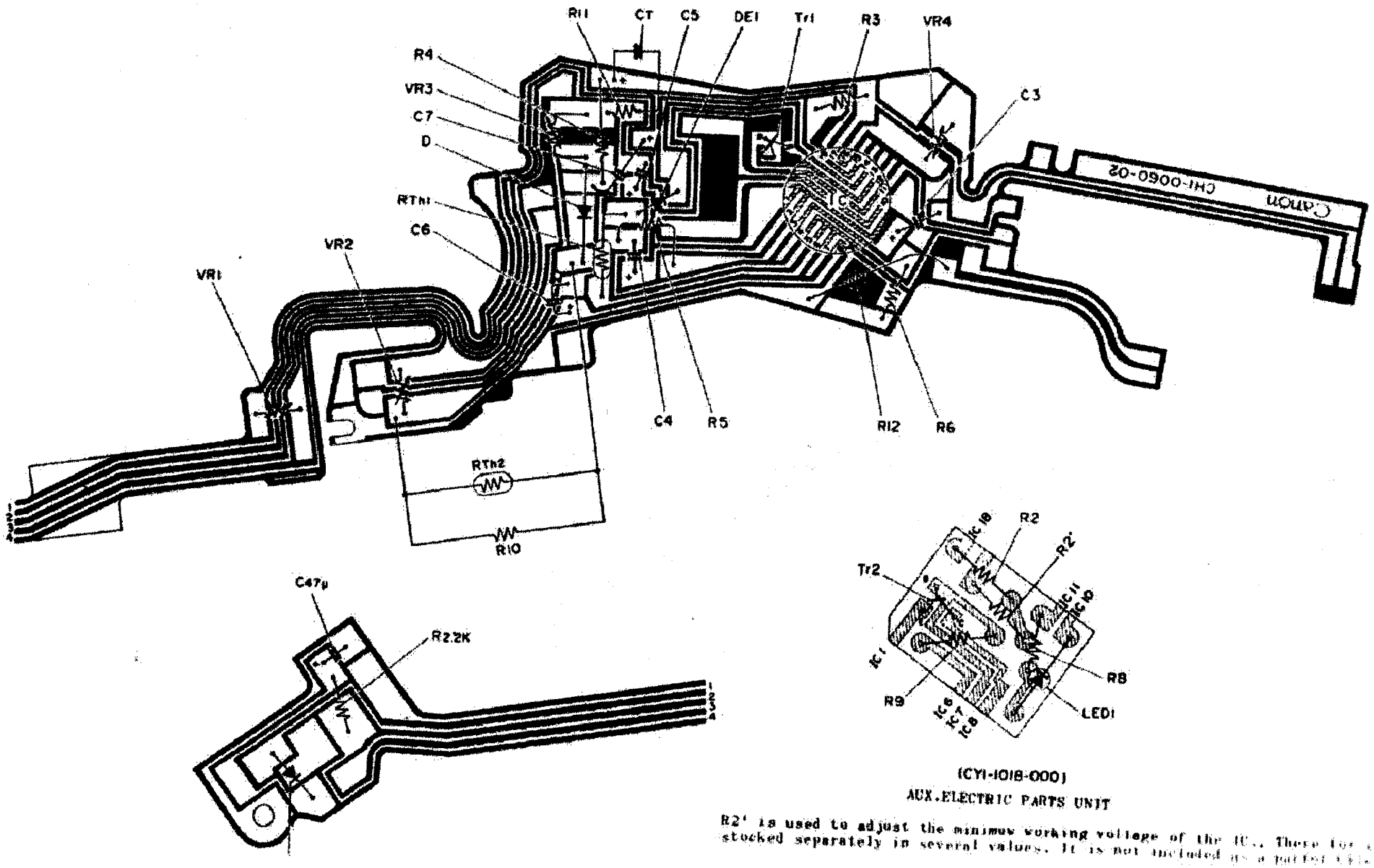
CANON A1-1

SCHEMATIC DIAGRAM (3RD,4TH TYPE)

SW1 : BULB HOLD SWITCH
SW2 : RELEASE SWITCH
SW4 : COUNT SWITCH
SW5 : SHUTTER COCKED/READY SWITCH
SW5' : POWER WINDER ENABLE SWITCH
SW7 : SELF TIMER SWITCH
SW8 : BATTERY CHECKER switch
SW8' : MAIN SWITCH
SW12 : BULB SWITCH



ELECTRIC PARTS UNIT (2ND TYPE)



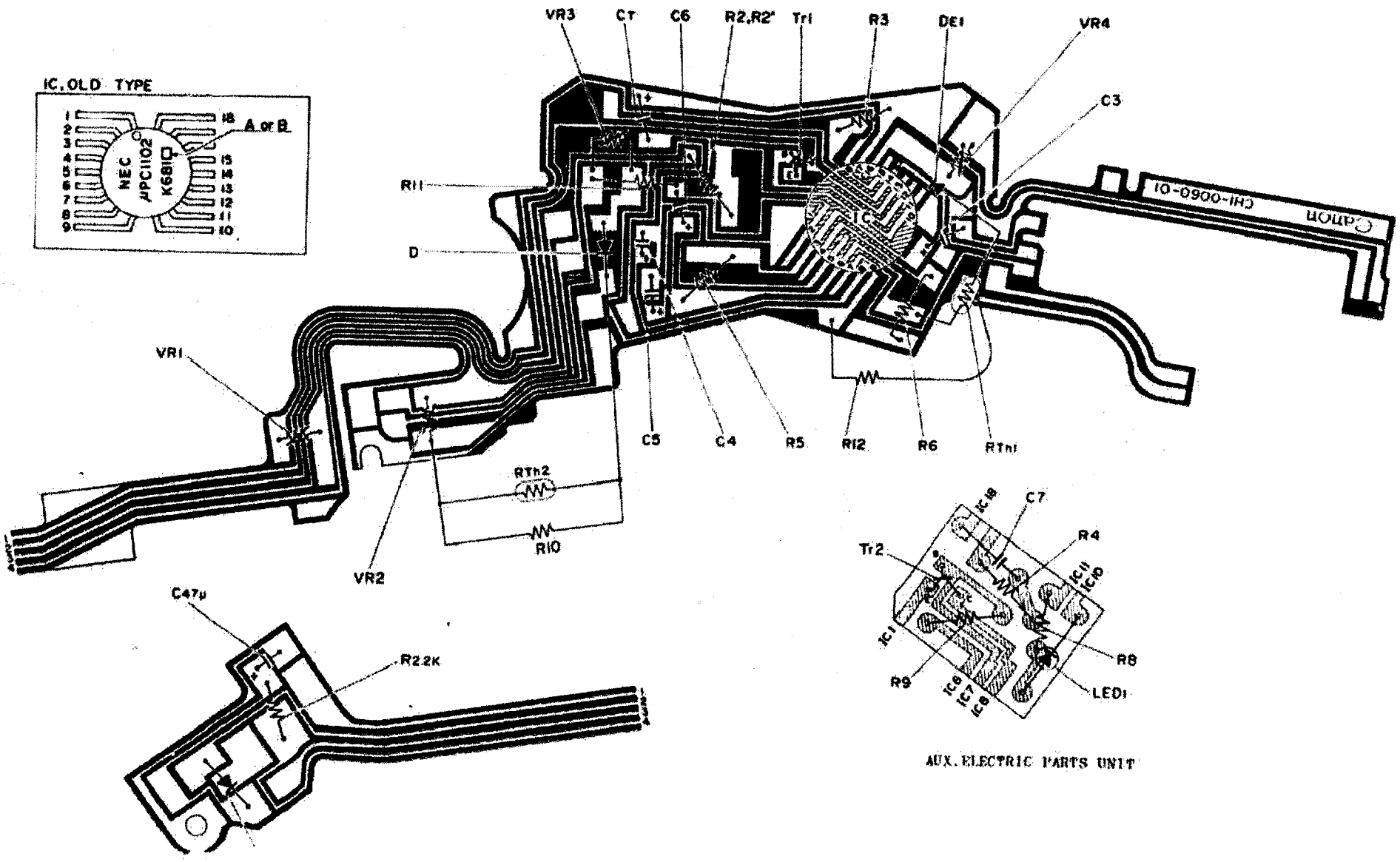
(CY1-1018-000)

AUX.ELECTRIC PARTS UNIT

R2' is used to adjust the minimum working voltage of the IC. There are 3 stocked separately in several values. It is not included as a parts [illegible]

CANON AT-1

ELECTRIC PARTS UNIT (1ST TYPE)

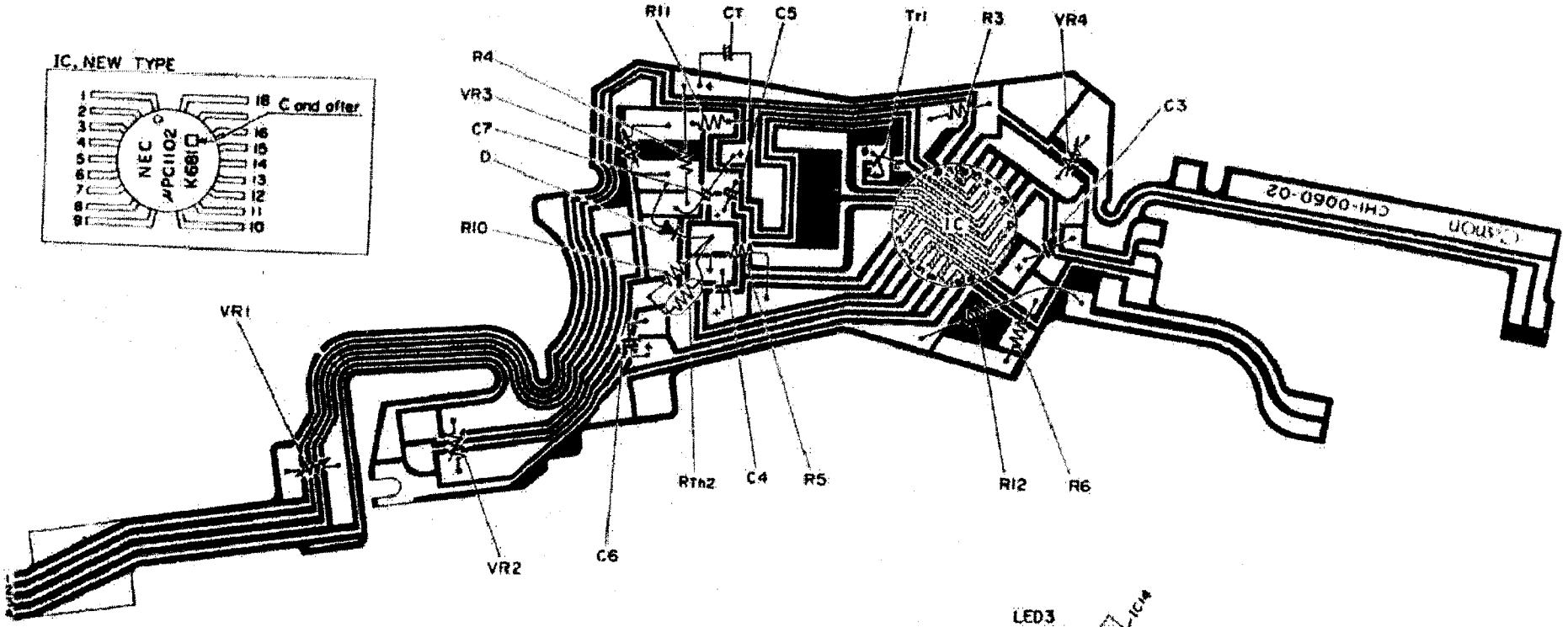


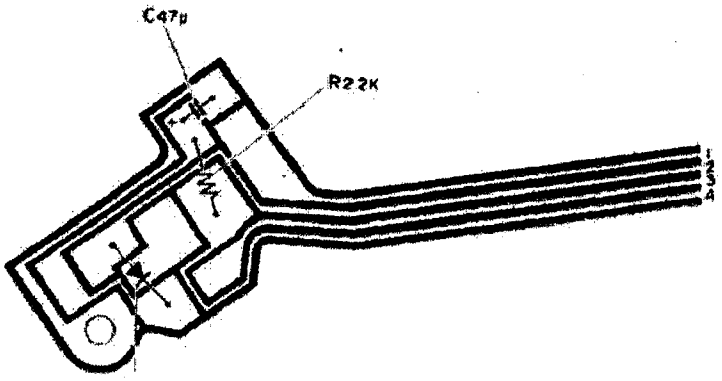
AUX. ELECTRIC PARTS UNIT

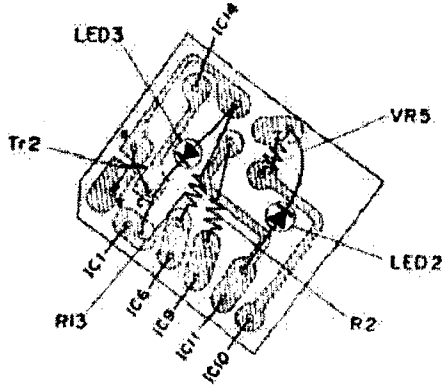
REF.NO.CI2-1501

CANON A1-1

ELECTRIC PARTS UNIT(CG1-0006-000)
(3RD TYPE)



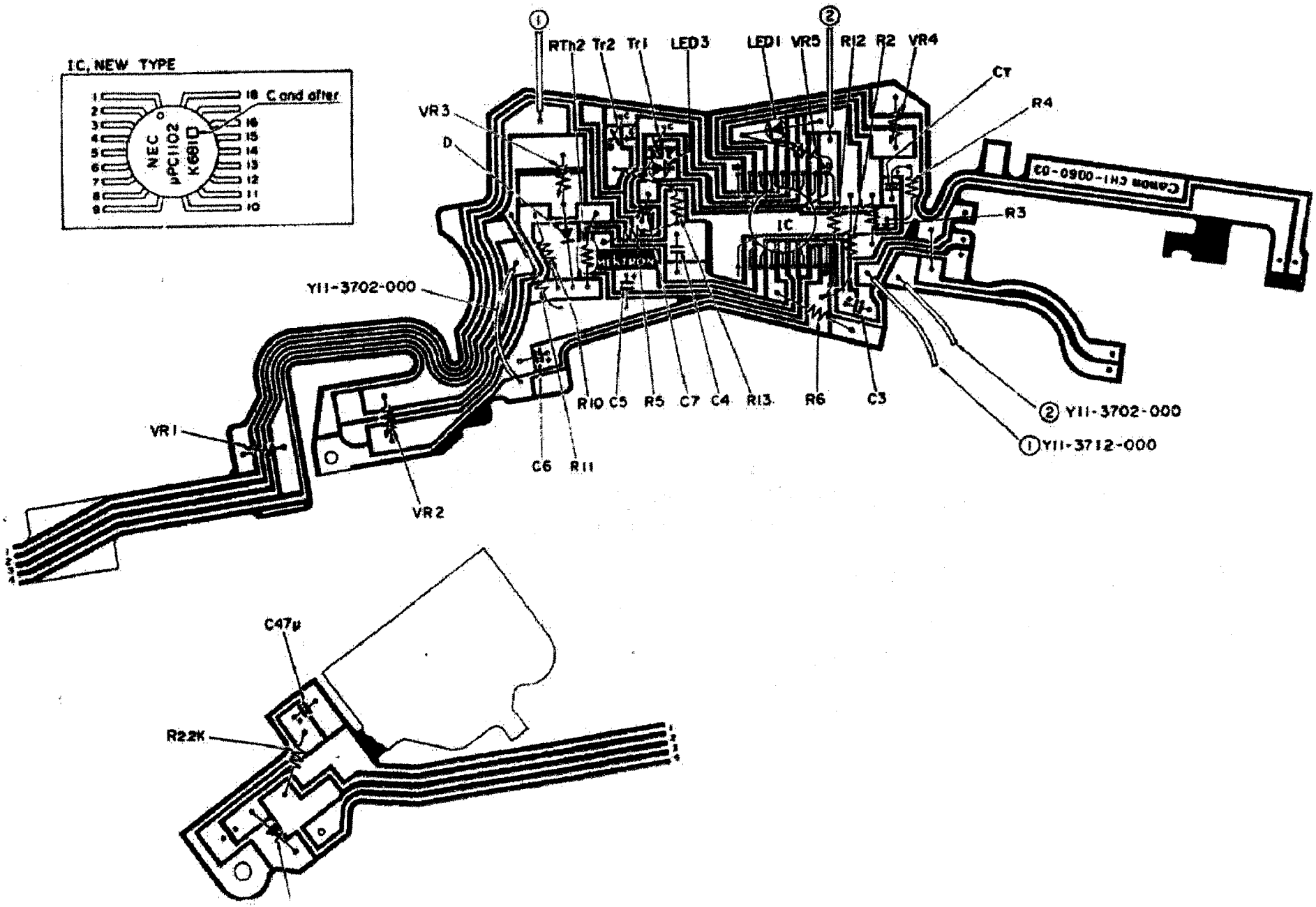




(CY1-1020-000)
AUX. ELECTRIC PARTS UNIT

ELECTRIC PARTS UNIT (CG1-0006-000)
(4TH TYPE)

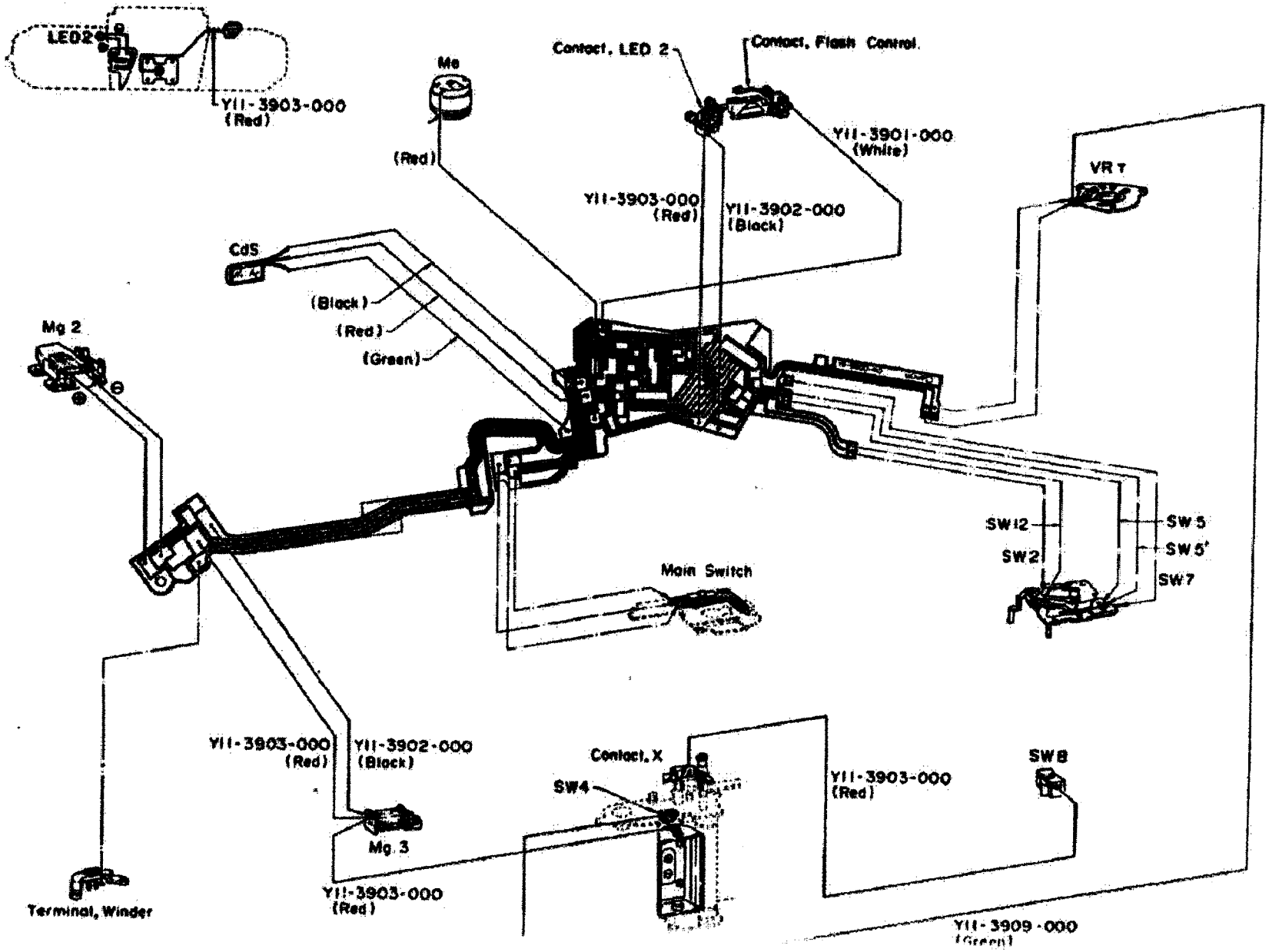
CANON AT-1

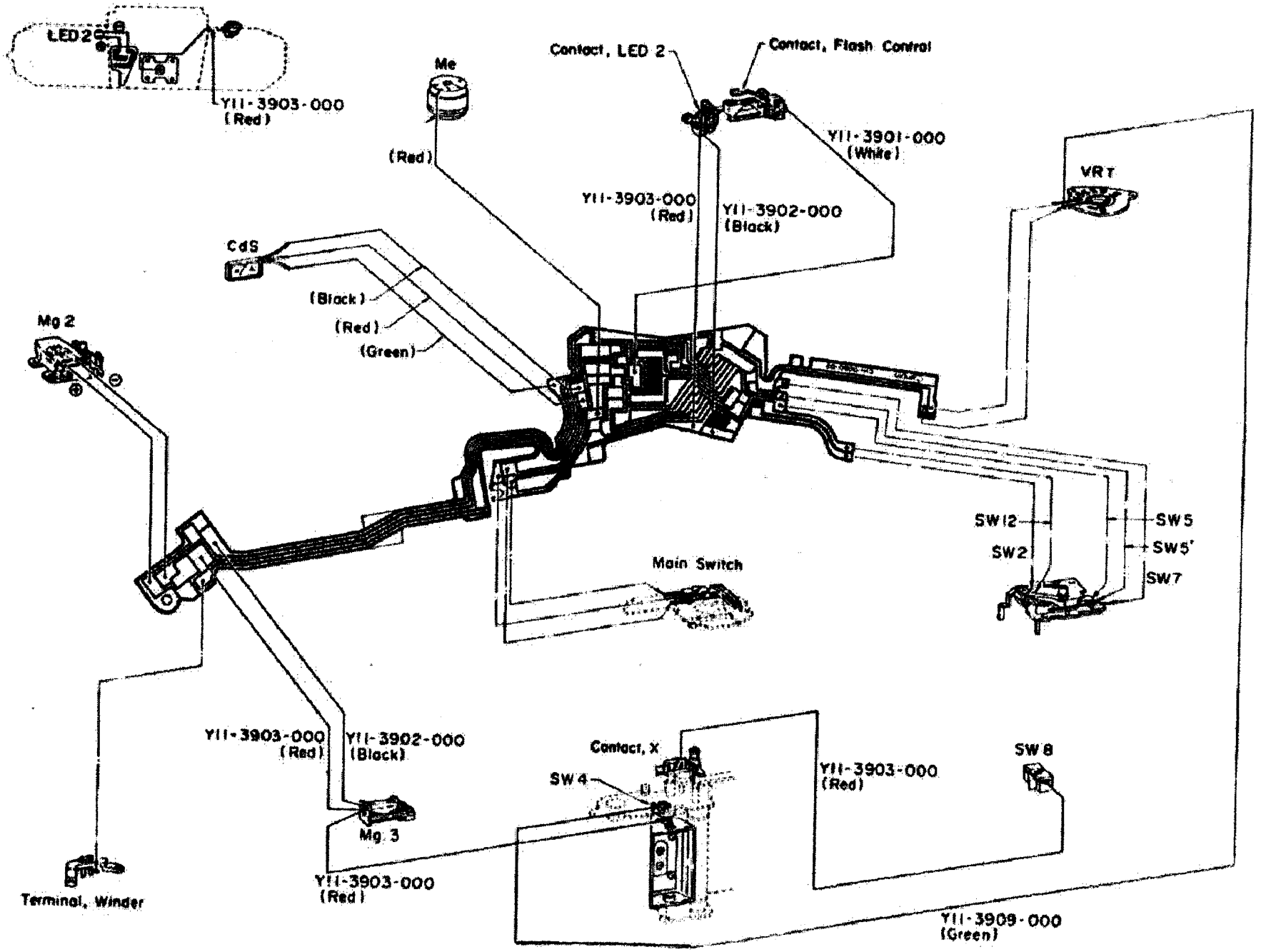


REF.NO.C12-1501

CANON AT-1

WIRING DIAGRAM
結 線 図
(1ST TYPE)



CANON AT-1

WIRING DIAGRAM
結 線 図
(2ND TYPE AND 3RD TYPE)